Recovery from Job Strain within Different Industries

Do the recovery experiences act universally across industries?

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Master's Programme in Work, Welfare and Wellbeing
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This study was a comparative study on the differences in recovery from job strain between different industrial groups. Previous studies have not properly investigated whether there are any differences in recovery between different occupational groups, thus this study took up, first of all, to study whether there are any differences in recovery from job strain between five different industries. Secondly, because recovery experiences have been found to be highly related with job situational factors, the study aimed to test whether there are interactions between the recovery experiences and industries with varying situational factors on the recovery outcome. The industries represented in this study were retail trade, information and communication, accommodation and food services, air travel services, and education. The recovery experiences were psychological detachment, relaxation, mastery and control during off-job time measured with the Finnish Recovery Experience Questionnaire. The measure of need for recovery was used as the recovery outcome. The data of the study was collected by a questionnaire as a part of a large research project by University of Tampere in 2006–2009. 527 participants answered to the questionnaire anonymously.

There were two sets of analyses within the study. The first set tested differences in need for recovery between the industries with one-way analysis of variance (ANOVA). Furthermore, the aim was also to describe which job situational variables and recovery experiences contribute to the differences. Therefore the analysis was repeated with control variables of job demands and resources, and with the four recovery experiences. Also, age and gender were used as control variables since they have also been found to be related with need for recovery. The test of analysis of covariance (ANCOVA) was used in case of the continuous control variables, and the test of two-way ANOVA was used with the categorical variable of gender. The second set of analysis aimed to test the interaction effect between the type of industry and the recovery experiences. Here, the recovery experiences were divided as categorical variables from the median score. A between subjects two-way ANOVA was used to test the interaction effect. There were four separate analyses for each recovery experience. Within the analyses it was also tested whether there would be differences in need for recovery between low and high levels of each recovery experience.

It was found, first of all, that there were differences in need for recovery between the industries. More closely, people working in information and communication industry had significantly lower need for recovery than people working in both education, and accommodation and food services industries. The situational factors were contributing to the levels of need for recovery, especially in the industry of education. Further, it was found that need for recovery was significantly lower within groups of high recovery experience than within groups of low recovery experience in case of each of the recovery experiences. This result was also consistent across all the industries, since no interaction was detected, suggesting thus that the recovery experiences have an industrially universal nature.

Keywords: recovery experience, recovery from job strain, industry, need for recovery

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1 Introduction

1.1 Preface

In this millennium, there has been a lot of discussion about the well-being at working life, or should we say ill-being instead. In the book of Juha Siltala (2004) called "The short history of deterioration of working life" (in original language "Työelämän huonontumisen lyhyt historia"), there are a whole variety of examples on how working life has deteriorated all around the world, and that is especially since the economic depression of the 1990s. The work culture had changed, for example, so that employees could not defend their rights anymore, rather they had to constantly try to show how worthy of employment they were. Also, the development of technology had caused employees to be available for contact anywhere and anytime. The living examples of the book demonstrate how this kind of working life lead especially to feelings of hurry and lack of time to properly complete work tasks. (Siltala, 2004). Inevitably, this kind of working life also leads to increasing levels of stress, which could be defined simply as a psychological and physiological reaction to an external threat (Buunk, de Jonge, Ybema & de Wolff, 1998, p. 148), which, in the working life, could be the feelings of hurry.

The views of Juha Siltala (2004) are, however, quite extreme, as some might say, and there has been discussion about how the increase of stress levels could also be just the result of the conceptualisation of stress (See e.g. Julkunen, 2008, pp. 11–12). Still, we cannot deny what all the statistics say about working conditions and the resulting well-being effects. For example, the statistics compiled by Statistics Finland show an overall increase especially in sleeping difficulties, and in feelings of tiredness and reluctance, among Finnish working people. And these symptoms, among other mental and somatic symptoms, were found to be related to the hindrance of hurry and other working conditions. (Sutela & Lehto, 2014, pp. 195–199.)

Although stress has been seen as the main problem in explaining health impairments in working life, Lundberg (2005) pointed out with convincing physiological arguments that the problem is not actually the absolute level of stress, but in fact, it is the lack of recovery or rest that causes the greater health damages. This argument is also very much distinguishable in Geurts and Sonnentag's (2006) definition on recovery from job strain. In this definition, recovery is seen as the opposite of the

psychophysiological activation during effort expenditure, such as under stressful conditions. Recovery is thus a process of psychophysiological unwinding and it is a significant agent in preventing acute stress reactions becoming chronic stress reactions (Geurts & Sonnentag, 2006).

It is quite obvious that the effort expenditure may not always be the same in different work situations. If we go back to the statistics, for instance, they show differences in working conditions between different lines of work. According to the same statistical report referred above, the hindrance of hurry, for instance, was experienced most in the health care domain in 2013. Among women, feelings of hurry disturbed also people working in the domain of teaching. Men were most disturbed by hurry, in addition to health care domain, in the line of traffic and electricity, and in the line of electronics. (Sutela & Lehto, 2014, p. 69–70.) Thus, since the strain and conditions of different lines of work are different, the recovery outcome and the recovery process might be different among people within different lines of work as well. The current study aimed, first of all, to find out whether there are any differences in recovery form job strain between different industries, and then, whether the recovery processes are also different between these industries.

1.2 Theories and models on stress

Since recovery from job strain is closely linked to the concept of occupational stress, it is worthwhile to look into some theories and models of stress before going into detail with recovery. One classic model of stress is the Job Demands-Control model by Karasek (1979). He argued that job strain is a result of the combination of job demands and job decision latitude. More specifically, it is low decision latitude and high job demands that cause mental strain at work. Job demands do not directly predict the symptoms of strain, since if one can decide how to deal with the demands, it actually leads to active energy that overcomes the symptoms of strain. Later, some researchers expanded the model to include social support, and individual differences in adapting to the job demands, as determinants for the strain effects (see e.g. Rodriguez, Bravo, Peiro & Schaufeli, 2001). Although Karasek's (1979) model is one of the first to take account both demands and resources of the work when considering the stress outcomes, it is still quite simplistic to explain mental strain and does not consider recovery to be part of the process.

Also according to the Job Demands-Resources model, it is the interaction of job demands – the physical, social and organisational aspects of the work that require physical or mental effort – and the job resources, that lead to unwanted health effects (Demerouti, Bakker, Nachreiner & Schaufeli,

2001). However, this model took a little bit broader view with the job resources by referring to all "physical, psychological, social, or organizational aspects of the job that may do any of the following: (a) be functional in achieving work goals; (b) reduce job demands at the associated physiological and psychological costs; (c) stimulate personal growth and development" (Demerouti et al., 2001, p. 501). In addition, Demerouti et al. (2001) argued that the negative health effects follow two kinds of processes: the health impairment process and the motivational process. That is, job demands lead to exhaustion, and lack of job resources to disengagement from work. It could be said that this model offered a more comprehensive model than the Job Demands-Control model, but it still did not take account the process of recovery in the picture.

Meijman and Mulder (1998), on the other hand, developed a quite broad theory on occupational stress, the Effort-Recovery model, in which they highlighted the role of recovery. According to this model, recovery depends on the work demands, the work potential, and the decision latitude one has in the job. That is, the level of work demands determine how one can recover from the job strain, and in addition, the work potential and decision latitude can affect how one is capable of coping with the work demands. It follows that if one has really high and difficult job demands, and at the same time, the work potential and decision latitude are low, he or she might have great difficulties recovering from the strain the work demands have caused, and it might accumulate as chronic health problems.

The Effort-Recovery model distinguishes two kinds of work demands. These are the formal aspects of the work situation, and task demands and environmental factors. The formal aspects of the work situation can be, for example, the work assignment, the work environment and facilities, and the work relations, such as hierarchical relationships. The task demands are, on the other hand, concrete demands for the specific task, and these are always met in a certain environment that may induce its own demand. The work potential refers to the actual mobilization and behavioural repertoire of the worker. The behavioural repertoire means the biological or psychological dispositions the person has, such as memory, and which the person needs to fulfil the task demands. Actual mobilization is then the energetical processes that determine on what level the person is capable of operating with the behavioural repertoire. If a person is very tired, for example, he or she might not be very attentive with the work task. Finally, the decision latitude refers to the choice one has in determining a specific processing strategy or work procedure, which depends on the control the situation allows. (Meijman & Mulder, 1998.)

Another, quite different, but not necessarily disproving the previous models, is Hobfoll's (1989) Conservation of Resources Theory. The basic idea of Hobfoll's (1989) theory is that stress is caused because there are environmental events that threaten people's resources. These resources can be, for example, mastery, self-esteem, socioeconomic status, and employment. When people encounter stress they try everything they can to minimise the loss of these resources. When there are not any resource threatening events taking place, people try instead to gain new resources for possible new threatening events. The gaining of new resources is the process that can be referred to as recovery. People might exercise on their spare time, for example, to gain energy and strength to get through hard and burdensome working days, or they might take some courses to build up their skills.

As can be seen, the models and theories are not that far from each other, they just highlight different aspects in the process of occupational stress. What is in common for all of these theories, is that they all take account the antecedents of stress. For instance, the job resources in the Job Demands-Resources model (Demerouti et al., 2001) are quite comparable to the work potential and the decision latitude in the Effort-Recovery model (Meijman & Mulder, 1998), but the latter also emphasises the personal attributes in the process. The following literature on recovery supplements and broadens the view on stress building even more comprehensive picture on the phenomenon.

1.3 Recovery from job strain

1.3.1 The Model of Recovery, Work and Health

Within the recovery literature, Geurts and Sonnentag (2006) developed a model that points specifically where in the process of stress recovery comes to play an important part. The model is called the Model of Work, Recovery and Health (See Figure 1). Geurts and Sonnentag (2006) emphasize that recovery is a process which plays an important role in not turning acute stress reactions into chronic health effects. In other words, work predisposes us always on some level of strain, and causes stress reactions, but recovery as a process intervenes here for not turning those reactions into long term health impairments. This model is based on McEwen's (1998) theory of allostatic load system, which will be discussed below with a more comprehensive definition of recovery.

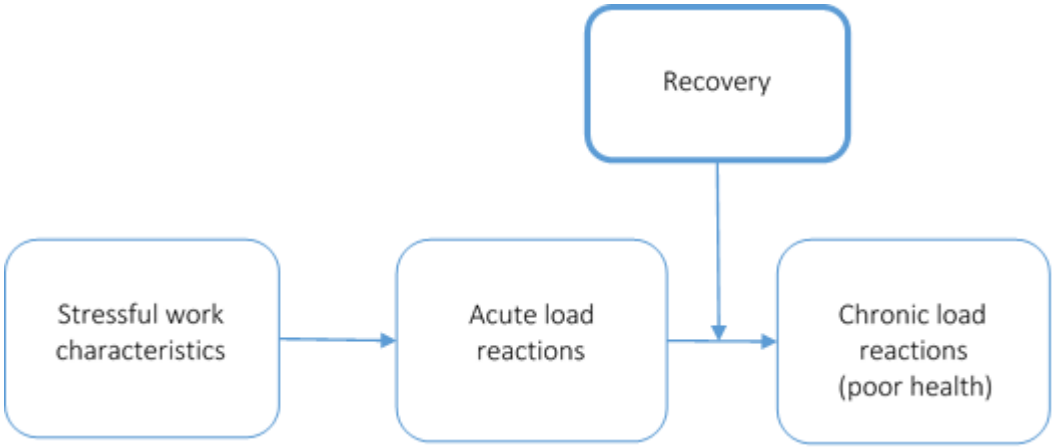

Figure 1. Model of work, recovery and health (Geurts & Sonnentag, 2006)

1.3.2 Definition of recovery

Recovery was already defined in the preface as psychophysiological unwinding, which is an opposite of psychophysiological activation during effort expenditure (Geurts & Sonnentag, 2006). This definition has its premises in McEwen's (1998) theory of allostatic load system, which describes how the stress balancing systems of the body become overloaded in certain circumstances. That is, we all have this physiological system that gets activated under stressful situations for to adapt to these situations, and to cope with them. In other words, the system will get us to cope with stressful situations when it is successfully turned on when needed, and then successfully also turned off when these challenging situations are over. But, this system can get overloaded, for example, if the stress induced challenges continue over long period of time, and the system cannot be turned off. This is when it gets dangerous for health. Kivimäki et al. (2006), for example, showed, in a prospective cohort study of 788 industrial employees, that incomplete recovery was a significant predictor for cardiovascular death.

In everyday language, if you encounter, for instance, feelings of hurry, or other kind of pressure in your work that makes you feel stressed, the cardiovascular, immune, and metabolic systems will immediately increase activation. You might notice this as an increase in your heart rate. This activation is a good thing as long as it does not last for too long. It will keep you active and alert to cope with the stressors. But, when the stressful situation continues, due to, for example, overtime work, when the work time extends on your spare time, or when you encounter similar stressors on your spare time than at your work, it will eventually tear you down. So here, we can easily see what

role recovery plays in this picture. Recovery disengages you from the stressors and turns down the "allostasis", the physiological activation (Geurts & Sonnentag, 2006).

Above, the term recovery was referred to as the process of recovery. The term is, however, also used to refer to the settings in which recovery may occur, and also to the recovery outcome (See e.g. Fehrmann & Depenbrock, 2014). As a setting, recovery can happen as rest breaks during work hours (internal recovery), or as spare time after work, weekends, or longer holidays (external recovery) (Geurts & Sonnentag, 2006). Research has shown that especially daily recovery (e.g. Sonnentag, Binnewies & Mojza, 2008; Demerouti, Bakker, Geurts & Taris, 2009) and recovery during weekends (e.g. Fritz & Sonnentag, 2005) are important, but with longer holidays, the effect on health seems to fade away fairly quickly after getting back to work (de Bloom et al., 2010). The current study focuses on daily recovery after work days.

1.3.3 Recovery as an outcome

Because of the physiological premises, recovery, as an outcome, has been naturally measured with physical indicators. For example, Sluiter, Frings-Dresen, van der Beek, Meijman and Heisterkamp (2000) measured the urinary excretion of adrenaline, noradrenaline, and cortisol during and after 3 workdays for to study neuroendocrine reactivity and recovery. Recovery can be, however, measured with psychological indicators as well. This can be done by simply asking people to rate how recovered they feel before the next working day, or how much they feel they need to recover after or during the last hours of a working day. Two scales have been compiled to specifically measure these two psychological constructs of recovery. These are The Feeling Recovered Scale (Sonnentag & Kruel, 2006), and The Need for Recovery Scale (Van veldhoven & Meijman, 1994; as cited in Van Veldhoven & Broersen, 2003).

The Feeling Recovered scale can be used to measure how well one actually feels he or she has recovered after some recovering has taken place. In fact, Sonnentag and Kruel (2006) developed this 4-item scale as a part of their study to examine psychological detachment and its predictors, because they wanted a direct measure of recovery to assess the relationship between psychological detachment and recovery. A sample item would be "during evenings I feel recovered mentally". The answers were made with a 5-point Likert scale.

The Need for Recovery Scale, on the other hand, measures the feelings of need for recovery after a work day, or the feelings of need for recovery in general. Need for recovery refers to an emotional state with the need to stop the current demands, or the reluctance to take up new demands, and it can be referred to as a very early state sign of long term strain (Sonnentag & Ziljzra, 2006). The Need for Recovery Scale was originally put together by Van Veldhoven and Meijman (1994; as cited in Van Veldhoven & Broersen, 2003) as part of a Dutch questionnaire on the experience and evaluation of work. The Need for Recovery Scale has been used separately in many occasions since then, and Van Veldhoven and Broersen (2003) took up to study further its measurement quality and validity. The scale consists of 11 items which inquire about the severity and duration of symptoms that refer to the need for recovery. A sample item is: "Because of my job, at the end of the working day I feel rather exhausted". The original answering categories were simple dichotomous "yes" or "no", for the purpose to make as simple as possible measurement scale for occupational health practice.

1.3.4 Different experiences of recovery and the recovery experience questionnaire

By the observation of the recovery research being almost solely concentrated on the general effects of off-job episodes, like vacations and weekends, or on specific off-job activities, Sonnentag and Fritz (2007) turned their attention to the processes or underlying psychological experiences of recovery from job strain. From the literature and theory of mood regulation and job-stress recovery, they came up with four different experiences by which recovery from job strain could occur. These experiences were psychological detachment from work, relaxation, mastery and control during off-job time.

Psychological detachment means not only being physically away from the workplace, but being mentally away from the work related tasks (Sonnentag & Fritz, 2007). In practice, it means you do not receive work related phone calls or emails during your leisure time, you do not do tasks or activities related to your work, and you do not even think about work related things. Psychological detachment has been reported, for example, to be related with low fatigue and positive mood in the evening hours (Sonnentag & Bayer, 2005). In theory, the effect of psychological detachment on recovery goes well together with Meijman and Mulder's (1998) Effort-Recovery Model. That is, recovery occurs when no more demands are made upon the system which is active during work time.

Relaxation is another recovery experience that can be said to follow the idea of the Effort-Recovery Model. It is an experience which is associated with a state of low activation and increased positive affect (Sonnentag and Fritz, 2007). It can be experienced when engaging in variety of activities. You

may feel relaxed, for example, when walking outside in the nature, when listening to music, or when actually deliberately engaging in activities aiming at the relaxation of body and mind, such as muscle relaxation exercises. Usually the activities resulting to relaxation are characterised by low physical, social, and intellectual demand. Well-being benefits from relaxation has been reported, for example, in a study by Stone, Kennedy-Moore and Neale (1995). They found that relaxation, as a coping mechanism for stressful situations, was positively related to positive affect.

The other two recovery experiences, mastery and control, can be seen to follow Hobfoll's (1989) Conservation of Resources Theory. To experience mastery on leisure time, it demands a little bit more effort than gaining relaxation experiences, but it helps recovery, because by experiencing mastery you will build up new internal resources, such as self-efficacy, skills, and competencies (Bandura, 1997; Hobfoll, 1998; as cited in Sonnentag & Fritz, 2007), and in addition, it will usually result in increase of positive mood (Parkinson & Totterdell, 1999; as cited in Sonnentag & Fritz, 2007). Fritz and Sonnentag (2006) also demonstrated the relation of mastery experiences on recovery in a study where mastery experiences during vacation were associated with low exhaustion immediately after the vacation. As with relaxation, mastery experiences can also be gained by doing variety of activities. These can be, for example, taking a course on a subject matter different from your work activities, learning a new language, or learning a new hobby, such as skiing or drawing.

The fourth recovery experience, control during off-job time, Sonnentag and Fritz (2007) argue to lead to recovery, because it has been shown to be associated with positive reactions, lower distress, and higher psychological well-being. Griffin, Fuhrer, Stansfeld and Marmot (2002), for example, demonstrated that low control at home was a risk factor for both depression and anxiety. In practice, control means that a person has a choice what he or she can do during leisure time. It may also include the control of when and how to do these leisure activities. (Sonnentag & Fritz, 2007.)

By brainstorming, and with the background of the mood regulation and recovery literature, Sonnentag and Fritz (2007) came up with a 47-item questionnaire to measure the four recovery experiences. Eight items measured psychological detachment, eleven items measured relaxation, sixteen items measured mastery, and twelve items measured control. They let psychology students from different levels to assess the items, after which the items were reduced to 37 items for further development (8 items for psychological detachment, 9 for relaxation, 11 for mastery, and 9 for control). The questionnaire was tested with a sample of 991 employees from a variety of private and public organisations. The participants were asked to answer the item statements on a 5-point scale from 1

("I do not agree at all") to 5 ("I fully agree"). A confirmatory factor analysis confirmed the four recovery experience factors as separate constructs and finally resulted as a 16-item questionnaire with 4 items measuring for each recovery experience.

Sonnentag and Fritz (2007) also tested the four recovery experience constructs further with some possible predictors and consequences that had been studied within other recovery research previously. Most importantly, they found the recovery experiences to be related with job situation variables and with psychological well-being variables. More closely, from the job situation variables, time pressure was negatively related to all of the recovery experiences, except mastery. Role ambiguity and situational constraints were negatively related to both psychological detachment and control, hours of overtime was negatively related to psychological detachment and relaxation, and job control was positively related to control during off-job time, as was predicted.

Regarding the psychological well-being variables, all the recovery experience variables were, first of all, positively related with life satisfaction. In addition, mastery was negatively related to emotional exhaustion, depressive symptoms, and need for recovery. Relaxation was also negatively related to emotional exhaustion and need for recovery, but on the other hand, it was negatively related to health and sleep problems as well. Lastly, psychological detachment and control were both negatively related to health complaints, emotional exhaustion, depressive symptoms, need for recovery, and sleep problems. (Sonnentag & Fritz, 2007.)

1.3.5 Recovery research in Finland

In Finland, the interest on recovery from job strain seem to have appeared in the occupational health literature during this millennium. For example, Härmä (2006) discussed about the association between work hours and sleep as recovery. Kivistö and Kivistö (2009) studied the relationships of recovery modes, such as mental detachment from work, annual holidays, and time spent awake, with work demand factors and health effects with a sample of IT-professionals. Also the aforementioned Kivimäki's et al. (2006) research on recovery and cardiovascular death was conducted in Finland.

In 2006, started a three years' research project on recovery from job strain at the University of Tampere (See Kinnunen & Mauno, 2009). The project involved a 12-page questionnaire with a follow-up after a year, and a diary study. There are several research publications on the data collected within the research project. Siltaloppi, Kinnunen and Feldt (2009), for instance, aimed to study the

recovery experiences as moderators in the relationship between psychosocial work characteristics and occupational well-being, operationalised as need for recovery, job exhaustion, and work engagement. They found that psychological detachment and mastery protected against increased need for recovery when there were low job control at work, and that relaxation protected against job exhaustion when there were high time demands. In addition, psychological detachment had the strongest direct relationship with the well-being effects, mastery had the strongest relationship with work engagement, control during off-job time had a relationship only with need for recovery, and relaxation was not related to any of the well-being effects. Additionally, the study confirmed the relationships between both job demands and need for recovery, and job resources and need for recovery. More specifically, the job demand variables of weekly working hours and time demands were both positively related to need for recovery. On the contrary, job resource variables of control at work and justice of the supervisor were both negatively related to need for recovery.

The research project data has also been used to study identified groups of need for recovery based on the development of the need for recovery within a year (Siltaloppi, Kinnunen, Feldt & Tolvanen, 2012), and groups of identifying patterns of the recovery experiences across one year (Siltaloppi, Kinnunen, Feldt & Tolvanen (2011). Mainly, the former study demonstrated that people in the most favourable group of need for recovery had the most favourable work characteristics and higher levels of psychological detachment, relaxation, and control during off-job time. The latter study demonstrated, on the other hand, that those in the most favourable group of recovery experiences, that is with high and stable levels of all the recovery experiences within the year, suffered the least from job burnout and sleep problems.

One of the series of studies within this research project was conducted with the collaboration of one of the most known Dutch job recovery researchers. That is the study of Kinnunen, Feldt, Siltaloppi and Sonnentag (2011), in which they applied the Job Demands-Resources model, and aimed to find out whether recovery fitted in the model as a mediator. More closely, they hypothesised that recovery experiences would act as mediators within the two underlying processes of Job Demands-Resources model. That is, psychological detachment and relaxation would work within the health impairment process, mediating the effects of job demands on fatigue, measured as job exhaustion, need for recovery, and own recovery evaluation. Mastery and control during off-job time, on the other hand, would work within the motivational process mediating the effects of job resources on work engagement, measured as vigour, dedication and absorption. Two of the recovery experiences were found to play the role of mediators within the model, giving partial support for the hypotheses. More

specifically, detachment mediated the effects of job demands on fatigue at work, and mastery mediated the effects of job resources on work engagement.

Kinnunen et al. (2011) also tested the validity of the Finnish Recovery Experience Questionnaire, and concluded that the translated version of the questionnaire had good construct validity. Within the study, all the recovery experiences were also found to correlate with each other, with the exception between psychological detachment and mastery. Furthermore, the study supplemented the results of Siltaloppi et al. (2009) by confirming the relationship between both job demands and need for recovery, and job resources and need for recovery, with two additional variables. That is, demands in decision making were found to correlate positively with need for recovery, and on the contrary, social support was found to correlate negatively with need for recovery.

Pennonen (née Siltaloppi, 2011) brought these four above mentioned studies together in her doctoral thesis, and overall, demonstrated that the recovery experiences as a process of recovery, in addition to off-job activities, have a significant role in the occupational health. That is to say, Pennonen (2011) broadened the model of antecedents and consequences of occupational health by highlighting the processes in between.

Later, Kinnunen and Feldt (2013) continued further the research on the connection between the job characteristics, recovery experiences, and occupational well-being outcomes. They used a longitudinal design with a one year span. That is, they studied whether job characteristics (job demands and job resources) would predict recovery experiences and occupational well-being after one year. Also, they studied whether recovery experiences would predict occupational well-being after one year. They found that high job demands had inhibitive effects on psychological detachment, relaxation, and control during off-job time, and job resources, on the other hand, promoted better mastery experiences. These effects were not, however, reflected in the well-being outcomes after one year.

1.3.6 Recovery and different work characteristics

Quite a few studies on recovery have used a sample from only one or few lines of work. For example, the study of Kivistö and Kivistö (2009) was about IT-professionals' recovery, and the Kivimäki's et al. (2006) study involved only workers in the line of industry. Similarly, Sonnentag and Natter (2004) studied a sample of flight attendants, and one of the most surprising finding in their study was that

social activities among this group was associated with increased depression during evening, although social support and time spent with other people during off-job time have earlier been associated with well-being (Hobfoll, 1998; Viswesvaran, Sanchez & Fisher, 1999; as cited in Sonnentag & Natter, 2004). Nevertheless, the association between recovery and the work characteristics have been demonstrated in several studies, of which at least the studies in Pennonen's (2011) thesis and the study of Sonnentag and Fritz (2007) used a sample consisting of people from various different fields of work.

However, there are only few studies that have explored the association in a setting of comparison. Sluiter et al. (2000), for example, compared workers divided into groups of mental work, physical work, and combined mental and physical work. They measured recovery with physical measures, that is, with measures of urinary excretion of adrenaline, noradrenalin, and cortisol. Mainly, it was found that the group with combined mental and physical work was in less favourable position, as compared to the other two groups, in respect of recovery measured in stress hormone excretion.

Sonnentag and Bayer (2005), on the other hand, compared groups of different occupations as a part of their study with a sample of 87 participants. There were seven industry types: manufacturing; retail; real estate, renting, and business activities; public administration and defence; education; health; and other community, social, and personal service activities. They tested if there would be differences in well-being measures (fatigue and positive mood) and psychological detachment between the industry types, but they found no significant differences, and therefore did not include these industrial categories in their further study. They also tested whether there would be any interaction effects between the industry type and psychological detachment on the well-being measures, and between the industry type and workload on psychological detachment, but did not detect any significant interactions either. The sample size was quite small in their study, especially when dividing it to seven industrial groups. It might thus be that the effects were just not detected with this small sample.

1.4 The current study

The current study replicated the small part of the study by Sonnentag and Bayer (2005) which compared different industries, but with slightly different variables. First, the study aimed to find out whether there are any differences in recovery between different industries. Second, it aimed to test whether there are any interaction effects between industry type and recovery experiences on recovery. In this study, the measure of need for recovery was used as the dependent variable.

Besides being bigger than the sample in Sonnentag and Bayer's (2005) study, the sample of the current study had somewhat different industries represented, which might bring out some differences between the industries in this context. In the current study, the participants were from industries of whole sale and retail trade, information and communication, accommodation and food service activities, transportation and storage, and education. Recovery experiences were naturally the four recovery experiences by Sonnetag and Fritz (2007): psychological detachment, relaxation, mastery, and control during off-job time. That is, in the current study, the other three recovery experiences, not only psychological detachment, were also tested in respect of the interaction with industry type. Need for recovery was chosen as the recovery outcome, since it was reported to be an early sign of long term strain effects (Sonnentag & Ziljzra, 2006), and since it has been demonstrated to be associated with all four recovery experiences (Sonnentag & Fritz, 2007).

Thus, since job situational factors have been so strongly associated with need for recovery (e.g. Sonnentag & Fritz, 2007; Siltaloppi et al., 2009; Kinnunen et al., 2011), the current study expected there to be differences in need for recovery between different industries, although Sonnentag and Bayer (2005) did not find any differences with other well-being measures. The data of the current study also gave an opportunity to study the contribution of job situational variables to the possible differences in need for recovery between the industries. Thus, since the industries in this study were from quite different lines of work, it could be assumed that they were different in job demands and job resources as well. Therefore, following the Job Demands-Resources model (Demerouti et al., 2001), it was also expected that any differences between the industries would be contributed by different patterns of job demands and resources within the industries. Job demands and job resources were thus used as control variables. Similarly, recovery experiences were controlled, since they have also been found to be related with need for recovery (e.g. Sonnentag & Fritz, 2007; Siltaloppi et al., 2009; Kinnunen et al., 2011).

Weekly working hours, time demands, and demands in decision making were selected as job demand variables to this study, since they all were found to be related with need for recovery in the studies of Siltaloppi et al. (2009) and Kinnunen et al. (2011). In addition, since physical demands have been found to be related to the occupational well-being factor of burnout (Bakker, Demereuti & Euwema, 2005), it was also added to the study as job demand variable. Similarly, job insecurity was added as a job demand variable, since it has been found to be positively related to need for recovery (Kinnunen, Mauno & Siltaloppi, 2010).

Job resource variables were also excerpted from the studies of Siltaloppi et al. (2009) and Kinnunen et al. (2011), except the variable of social support was divided as support from supervisor and support from co-workers. Thus, the job resource variables in the current study were control at work, social support from co-workers, social support from supervisor, and justice of the supervisor.

Also, background variables of age and gender were controlled, since they have been found to be related with occupational well-being factors as well (e.g. Mauno, Kinnunen, Mäkikangas, & Nätti, 2005; Kinnunen, Feldt, & Mäkikangas, 2008). The study by Siltaloppi et al. (2009) showed that age was also positively related with need for recovery, and that females have higher need for recovery than men.

Finally, since the recovery experiences have been so strongly associated with different work characteristics (e.g. Sonnentag & Fritz, 2007; Siltaloppi et al., 2009; Kinnunen et al., 2011), it was expected that there would be an interaction between industry type and recovery experiences on need for recovery, although Sonnentag and Bayer (2005) could not demonstrate it in their study with psychological detachment and well-being measures of fatigue and positive affect. Especially, since Kinnunen et al. (2011) found psychological detachment to mediate the effect of job demands on fatigue, it was expected that an interaction effect would be detected at least with psychological detachment. There were separate analyses for each recovery experience. At the same time, it was also tested whether the effect of the recovery experiences on need for recovery could be demonstrated in comparative design. That is, it was expected that need for recovery would be lower with higher scores on each recovery experience.

To summarise, the aim of the current study was, first of all, to find out whether there are any differences in recovery between different industries, and to uncover the characteristics of the industries that contribute to the differences. Next, the study aimed to find out whether the four recovery experiences – psychological detachment, relaxation, mastery, and control during off-job time – have different roles depending on the industry people work in. At the same time, the study tested the effects of recovery experiences on recovery by comparing groups of different levels of the four recovery experiences.

2 Methods

2.1 Data collection

The data used in this study was collected as a part of the research program in University of Tampere that was described also in the introduction (see Kinnunen & Mauno, 2009). It included a 12-page questionnaire with a follow-up after a year, and a diary study. The sample was collected from customer organisations of an occupational health organisation in the region of Tampere. Five organisations from different industries agreed to take part in the research program. The organisations were a hardware store, an airport service organisation, a wireless communication and software product organisation, a hotel and restaurant service organisation, and an educational organisation. Altogether 527 out of 1042 employees filled in the questionnaire (274 in the follow-up), and 81 employees from the organisations took part in the diary study.

In the current study, only the questionnaire data was used. The questionnaire consisted of 44 question items in total, but not all the items were used in the current study. More closely, there were five questions in the current study, and they consisted of 16, 8, 10, 9, and 16 items. Additionally, 14 out of 17 demographical questions were used to describe the sample.

Permission to use the data in this study, with a signed confidentiality agreement, was granted by a representative of the research program. In the following description of the methods, only the part of the procedure of the research project, which relate to this study, will be described.

2.2 Participants

The total number of participants in this study was 525. Two participants were excluded from the original count of 527 participants because of missing values. The participants answered to the questionnaire anonymously. The mean age of the participants was 42.4 years, and 53 % of them were women.

The participating organisations were categorised as industries by using the Statistical Classification of Economic Activities in the European Community (Eurostat, 2008), which is also used by Statistics

Finland (2008). The study industries were thus whole sale and retail trade, information and communication, accommodation and food service activities, transportation and storage, and education.

A hardware store organisation represented the industry of whole sale and retail trade. Work in this organisation included selling and serving customers with the expertise of building material, and in addition some logistical duties, such as shelving. Since the organisation could be classified according to a subclass of the main category, that is retail trade, it will be called by this sub classification name below. The industry of information and communication was represented by an organisation that develops products and solutions for software used in cars, and in addition, products and solutions for wireless communication. The organisation in the line of accommodation and food service activities was a large organisation directing a chain of several hotels and restaurants all over the country. The organisation within transportation and storage provided services in airport facilities. These services included, for example, services and security for travellers, and ground handling for airlines. This organisation could be classified under a subclass of service activities incidental to air transportation, and thus, this industry is called below air travel services. Finally, the work within the educational industry included mainly research and teaching students.

Demographics of participants by the industries are summarised in Table 1. The mean age was highest in the educational industry and lowest in the air travel services industry. The accommodation and food service industry was predominantly female with 82.8 % of women, and the information and communication industry was the most predominantly male industry with 88.1 % of men. The other three industries were more evenly distributed with gender. Most of the participants in each industry were in a relationship, but there were most singles in the air travel services industry. The most educated industries were education, and information and communication. The least educated participants were in the retail trade. In regards of work position, the air travel services, retail trade, and accommodation and food services had the most employees in labour positions. In information and communication, the participants were quite evenly distributed to officials (52.5 %) and managerial employees (47.5 %), and in the educational industry almost all the participants were in managerial employee position (97.4 %). However, when asked whether a participant was in a leadership position, the percentage was greatest in accommodation and food services (32.9 %), with air travel services and educational industries coming just behind with 29.8 % and 28.7 % respectively. Both retail trade and information and communication industries had about 17 % of the participants in

Table 1. Sample demographics by industry

Demographics	Industry				
	Retail trade (N = 55)	Information and communication (N = 59)	Accomm. and food service (N = 87)	Air travel services (N = 47)	Education (N = 277)
Average age in years (official statistics in Finland)	43.6 (39.0)	32 (39.5)	36.6 (37.1)	29.7 (41.6)	48.2 (44.0)
Percentage of women (official statistics in Finland)	40.7 (50.8)	11.9 (37.5)	82.8 (71.7)	51.1 (23.0)	54.9 (66.7)
Marital status (%)					
married/cohabited/ in registered relationship	68.5	74.6	67.8	57.4	85.5
Household (Mean)					
number of persons in household	2.2	2.2	2.2	2	2.8
number of children living at home	0.5	0.6	0.6	0.4	1
Education (%)					
Higher education (education after secondary school)	29.4	96.6	56.6	48.9	100
Work position (%)					
labourer	70.4	-	61.2	71.7	-
Official	27.8	52.5	25.9	21.7	2.6
Managerial employee	1.9	47.5	12.9	6.5	97.4
In leadership position	16.7	16.9	32.9	29.8	28.7
Working contract (%)					
In fixed-term employment	1.9	8.5	8.2	38.3	48.9
In part-time employment	5.6	-	41.4	34	5.1
Work and time (Mean)					
years worked in current workplace	15	3.9	7.5	1.9	12.9
years worked in current job	8.2	2.6	7.1	2.4	8.5
weekly work hours	38.8	40	36	41.2	47.5

leadership positions. Air travel services and educational industries had the highest percentages in fixed-term employment, and air travel services, and accommodation and food services had the highest percentages in part-time employment. People working in retail trade and education had on average the longest careers in the organisation. And finally, the educational industry had on average the highest weekly working hours with 47.5h/week. The other four industries had weekly working hours more closely to 40h/week.

To get an idea of how the study organisations generalise to the industries in the whole country, the demographics of age, gender and education could be compared to the official statistics by Statistics Finland. Statistics regarding age and gender, and the proportion of employees within industries in the whole country, could be retrieved for the same year as the data was collected, that is year 2007. The statistics regarding education were retrieved for the following year.

The statistics of age and gender in the official statistics can be seen in brackets in Table 1 under rows in question (Statistics Finland, 2007). As can be seen, the study organisations matched quite well to the national statistics regarding age and gender, except within air travel services industry the study participants were quite much younger than within the whole transportation and storage industry in Finland, and the majority of them were women, whereas in the whole transportation and storage industry in Finland, the vast majority were men. Also, the participants within information and communication industry were somewhat younger than information and communication employees generally in the country, and the percentage of women was smaller within retail trade, information and communication, and educational industries when compared to the national statistics.

According to the official statistics of Statistics Finland, the percentages for higher education by industries were 65 % within information and communication industry, 16 % within transportation and storage industry, 76 % within educational industry, and 25 % altogether within whole sale and retail trade and accommodation and food service industries (Statistics Finland, 2008). The participants within information and communication, and educational industries were the highest educated among the study industries, and thus it is well compared to the distribution of the national statistics. Although the official statistics presented the percentage of higher education together for whole sale and retail trade, and accommodation and food service industries, and therefore they could not be properly compared to the study organisations, the participants within retail trade, air travel services, and accommodation and food services were the least educated compared to the participants within information and communication, and educational industries, and thus the distributions were overall quite well compared to the national statistics. However, the participants in the study organisations were overall more educated within all study industries when compared to the national statistics. Here, it should also be reminded that the official statistics regarded the main categories of the industries, that is, whole sale and retail trade, information and communication, accommodation and food service activities, transportation and storage, and education.

The percentages of employees within these five industries in the whole country, according to the official statistics, were the following: whole sale and retail trade 38 %, information and communication 12 %, accommodation and food service activities 10 %, transportation and storage 19 %, and education 21 % (Statistics Finland, 2007). When compared to the distributions of participants in the industries in this study, it can be seen that the industry of accommodation and food services, for instance, is relatively bigger than the industry is overall in the country, and retail trade industry, on the other hand, is relatively smaller. In other words, accommodation and food services industry was a bit overrepresented, and retail trade underrepresented in this study.

2.3 Measures

2.3.1 Recovery experiences

To measure recovery experiences, the Recovery Experience Questionnaire compiled by Sonnentag and Fritz (2007) was used as translated to Finnish. There were four statements measuring each four recovery experience. “I forget about work” (in Finnish “Unohdan työn”) was an example statement measuring psychological detachment. An example statement for relaxation would be “I use the time to relax” (in Finnish “Käytän ajan rentoutuakseni”). Mastery was measured, for example, with a statement “I seek out intellectual challenges” (In Finnish “Etsin älyllisiä haasteita”). And lastly, the measure of control included statements such as “I determine for myself how I will spend my time” (in Finnish “Päätän itse, kuinka käytän aikani”). Participants were asked to answer to the statements with a 5-point scale (1 = totally agree, 5 = totally disagree). The items were recoded so that high score on each recovery experience indicated higher level of the experience. Cronbach’s alphas were .89 for psychological detachment, .83 for both relaxation and mastery, and .85 for control during off-job time.

2.3.2 Need for recovery

Need for recovery was measured with the original Need for Recovery scale by reducing the 11 items into 9 items to measure the situation specifically after a work day. The items were also translated to Finnish. The participants were asked to rate statements such as “Often, after a day’s work I feel so tired that I cannot get involved in other activities” (in Finnish “Työpäivän jälkeen olen usein liian väsynyt ryhtymään muuhun toimintaan”). The answers were made with a 4-point scale (1 = Never, 4

= always). One of the items was reverse from the others, thus, it was recoded so that all items indicated higher need for recovery with higher scores. Cronbach alpha for the measure was .89.

2.3.3 Job demands

Job demand variables were weekly working hours, time demands, demands in decision making, physical demands, and job insecurity. Weekly working hours were measured with one item which asked the participants to rate how many hours they worked within a normal week. Time demands and demands in decision making were measured with the QPSNordic Questionnaire (Elo et al., 2001). The measure of time demands included four items such as "Is it necessary to work at a rapid pace?". Cronbach's alpha for time demands was .78. Demands in decision making was measured with three items, e.g. "Does your work require complex decisions?", and Cronbach's alpha was .63. Physical demands were measured with two items adapted from the Finnish Working Conditions Survey: "Do the physical demands of the job cause you strain?" and "Does the physical environment (e.g. noise, dust, insufficient lighting) cause you strain?" (Lehto & Sutela, 2004). Cronbach's alpha for physical demands was .54. The participants answered to these four measures with a 5-point scale (1 = very seldom or never, 5 = very often or always). Lastly, job insecurity was measured with four items adapted from the measure of De Witte (2000; as cited in Sverke, Hellgren, Näswall, Chirumbolo, De Witte & Goslinga, 2004). An example item would be "I'm afraid, that I will lose my job". To these items, participants answered also with a 5-point scale (1 = totally agree, 5 = totally disagree). Cronbach's alpha for job insecurity was .90.

2.3.4 Job resources

Job resource variables were control at work, social support from colleagues, social support from supervisor, and justice of the supervisor. These variables were also assessed with the QPSNordic Questionnaire (Elo et al., 2001). The control at work measure included four items such as "Can you influence decisions that are important for your work?". Cronbach's alpha for this measure was .73. Answers were made with a 5-point scale (1 = very seldom or never, 5 = very often or always). Social support from colleagues was measured with two items, e.g. "If needed, can you get support and help with your work from your co-workers?" (Cronbach's alpha = .84). Social support from supervisor was measured with three items, e.g. "If needed, is your nearest superior willing to listen to your work related problems?" (Cronbach's alpha =.84). And, justice of the supervisor was measured also with three items, e.g. "Does your nearest superior distribute the work fairly and impartially?" (Cronbach's

alpha= .83). Answers for these three measures were again made with a 5-point scale (1 = very seldom or never, 5 = very often or always). There was also the option to answer 0 = Not applicable (no supervisor/ no co-workers), but participants choosing this option were excluded from the analysis.

2.4 Design and Procedure of the Analysis

The first set of study comparing need for recovery between the industries included one independent variable that was the industry type with five groups: retail trade, information and communication, accommodation and food services, air travel services, and education. The dependent variable was need for recovery. One-way analysis of variance (ANOVA) was used as the test method to test whether there would be any differences in need for recovery between the industries.

The analysis was also continued by adding job demand and job resource variables, recovery experience variables, as well as demographical variables of age and gender, one at a time into the model as control variables, to find out which of the variables contributed to the differences between organisations. The test method used for the continuous control variables was analysis of covariance (ANCOVA) and for the categorical control variable of gender a two-way analysis of variance (ANOVA).

In the second set of analysis there were two independent factors and the dependent factor of need for recovery. That is, the design of the study was a two independent factor, between subjects design aimed to test whether there would be any interaction effect between the factors of industry and recovery experience on need for recovery. The first independent factor was thus the type of industry with the five industry groups. The other independent factor was the recovery experience with two levels. To form the two levels of the recovery experiences, the scores were divided in two groups by cutting the scores to two halves from the median score (median scores: detachment = 3.0, relaxation = 3.8, mastery = 3.5, control = 4.0). The formed levels represented thus low level of the experience and high level of the experience. With every recovery experience the median score included several observations. Therefore, the median score was included in the half which made the groups more even. That is, with detachment, the median score was included in the lower half, and with the other experiences, it was included in the higher half. The four separate recovery experiences, control during off-job time, detachment, mastery, and relaxation, were analysed in separate analyses. The four separate analyses were executed with two-way analysis of variance (ANOVA), since there were two

independent between subjects factors. SPSS statistical package version 22 was used to conduct all the analyses.

3 Results

3.1 Differences in need for recovery between industries

3.1.1 Description of need for recovery, recovery experiences, job demands, and job resources by industries

Means and standard deviations of need for recovery, recovery experiences, and job demands, and resources by industry can be seen in Table 2. It is first of all clear that accommodation and food service, and educational industries have the highest scores in need for recovery. Information and communication industry has instead the lowest score in need for recovery. This can also be seen clearly in Figure 2, which displays mean need for recovery scores by industry as a bar chart. Secondly, educational industry has the worst psychological detachment. Also, detachment is lower within accommodation and food service industry when compared to the other three industries. Third, the mean of relaxation is lowest in the educational industry as well. The industries of retail trade and information and communication score the highest in relaxation. In regards of mastery, the lowest scores are in accommodation and food service, and retail trade industries, and information and communication industry score again highest. At last, with control during off-job time, the lowest mean is again within educational industry, and the other industries score more closely to mean score of 4.

Regarding job demands, educational industry seem to be the most disadvantaged with weekly working hours, time demands, and demands in decision making. On the other hand, people working in educational industry also seem to experience the most of control at work. Air travel services seem to have the most of physical demands at work when compared to the other industries. People working in information and communication industry seem to be the most insecure of their job, but at the same time, they experienced the most of support and justice from their supervisor. Accommodation and food service industry score the highest on support from co-workers.

The standard deviations seem to be quite stable between the industries across need for recovery and all the recovery experiences, except within information and communication, relaxation and mastery seem to deviate from the mean a bit less than within the other industries. It should be noticed as well,

Table 2. Means and standard deviations of need for recovery, recovery experiences, job demands and job resources, and sample sizes by industries

	Retail trade			Information and communication			Accomm. and food services			Air travel services			Education		
	M	SD	N	M	SD	N	M	SD	N	M	SD	N	M	SD	N
Need for recovery	2.09	0.54	55	1.96	0.57	59	2.31	0.56	86	2.18	0.54	47	2.23	0.53	277
Recovery experience															
Detachment	3.59	0.94	55	3.56	0.88	59	3.29	0.95	87	3.57	0.86	47	2.76	0.91	275
Relaxation	3.95	0.69	55	3.91	0.48	59	3.73	0.75	87	3.75	0.80	47	3.32	0.81	275
Mastery	3.63	0.70	55	3.51	0.65	59	3.29	0.83	87	3.35	0.81	47	3.44	0.85	275
Control	4.03	0.70	55	3.97	0.69	59	3.92	0.72	87	4.05	0.75	47	3.52	0.84	275
Job demands															
Weekly working hours	38.8	4.64	53	40	3.75	59	36	7.52	85	41.2	6.96	47	47	10.56	249
Time demands	3.02	0.62	53	2.91	0.80	59	3.36	0.82	85	3.47	0.80	47	3.71	0.70	249
Demands in decision making	3.42	0.63	53	3.50	0.76	59	3.70	0.70	85	3.75	0.82	47	3.83	0.59	249
Physical demands	2.25	0.95	53	1.70	0.74	59	2.70	1.07	85	2.72	0.90	47	1.73	0.76	249
Job insecurity	2.13	0.91	53	2.62	0.92	59	2.06	0.91	85	2.12	0.91	47	2.34	1.26	249
Job resources															
Control at work	2.72	0.68	53	3.39	0.49	59	2.66	0.93	85	2.56	0.64	47	3.43	0.67	249
Support from supervisor	3.51	0.92	53	3.87	0.71	59	3.83	0.79	85	3.55	0.96	47	3.12	1.07	249
Support from co-workers	4.13	0.83	53	4.26	0.61	59	4.35	0.66	85	4.24	0.88	47	3.80	0.91	249
Justice of the supervisor	3.66	0.84	53	4.09	0.80	59	4.03	0.82	85	3.88	0.96	47	3.71	1.01	249

that within accommodation and food services, and educational industries the sample size differs between need for recovery and recovery experiences. This is because there were missing values on need for recovery for one person within accommodation and food service, and within educational industry there were missing values for two people on all the recovery experiences. When looking at job demands and resources, it can be seen that there are two people missing within both retail trade, and accommodation and food service industries, and within educational industry even 28 people are missing. The participants with missing values in critical measures, depending on the analysis, were excluded from the analysis.

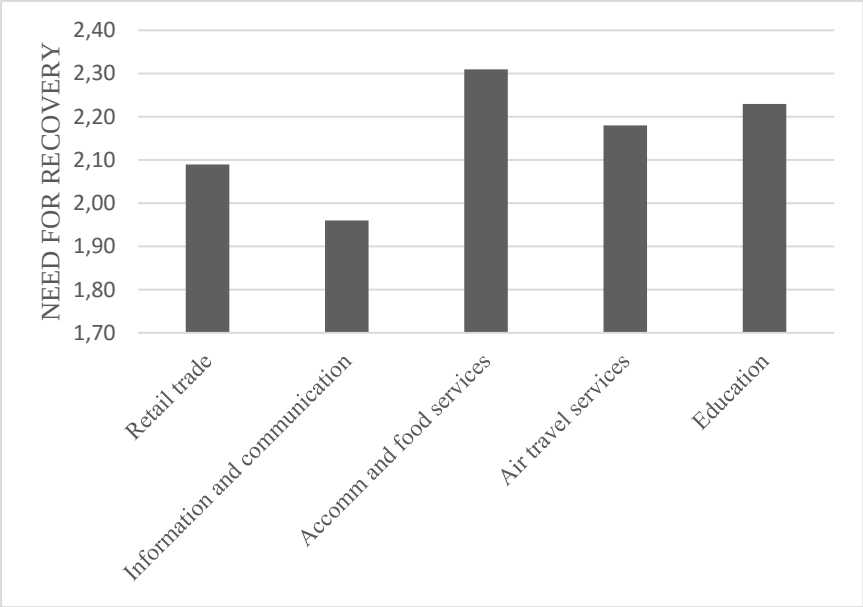

Figure 2. Need for recovery within each industry

3.1.2 Inferential statistics on differences in need for recovery between industries

One-way ANOVA was used to test whether there were significant differences in need for recovery between the industries. The assumption of homogeneity of variances was met as assessed by Levene's test ($p > .05$), but few outliers were detected within the industries of information and communication, air travel services and education, and the data was not normally distributed within information and communication, and educational industries as assessed by Shapiro-Wilk test ($p < .05$). The outliers were regarded as genuinely unusual values, and more closely, this kind of extreme values cannot actually be regarded as outliers within the 4-point scale measure used in the dependent variable of this study, so they were included in the analysis. The transformation of the data did not help with the violation of normal distribution, so it was decided to continue with the analysis regardless. Also, the data was a little bit positively skewed in every industrial group, so at least they were skewed to same direction.

The One-way ANOVA showed a statistically significant difference in need for recovery between the industries ($F(4,519) = 4.58$, $p < .01$). Bonferroni Post Hoc test revealed that the differences were between information and communication industry, and both accommodation and food service and education industries ($p < .01$). That is, people working in the industry of information and communication had significantly lower need for recovery than people working in accommodation and food service, and educational industries.

When age was added to the model as control variable, it was found that it did not predict need for recovery ($p < .05$). However, the control of age did somewhat change the differences between industries. That is, there was now a significant difference only between the industries of information and communication, and accommodation and food services ($p < .01$). Thus, since educational industry did not have significantly higher need for recovery than information and communication industry when age was kept constant, it seems that the high age within educational industry affected to the high level of need for recovery within the people working in educational industry. The assumption of normal distribution of the dependent variable was again violated within information and communication industry in this model, hence some caution should be taken into account with the interpretation.

The effect of gender was tested by carrying out a Two-way ANOVA with gender as the other independent variable and the type of industry the other. It was found, first of all, that gender did not have an effect to need for recovery ($F(1,513) = 0.61$, $p > .05$). In other words, there were no differences in need for recovery between men and women. Also, the effect of industry did not change from the original results. The people in industry of information and communication had still significantly lower need for recovery than people in accommodation and food service, and educational industries, although the effect was a bit weaker ($p < .05$). Finally, gender and the type of industry did have an interaction effect on need for recovery ($F(4,513) = 2.84$, $p < .05$). A simple main effect analysis revealed that there was a significant difference in need for recovery between men and women within educational industry ($p < .001$), but such differences were not found in other industries. Furthermore, the analysis revealed that there were no differences in need for recovery between the industries among men, but among women, information and communication industry had significantly lower need for recovery than accommodation and food service, and educational industries ($p < .05$), and also the industry of retail trade had significantly lower need for recovery than educational industry ($p < .05$). Thus, the differences in need for recovery could be said to be revealed only within women, but within men, the need for recovery is stable across the industries. The assumption of normal distribution was violated among men in both information and communication industry, and educational industry. Also, there were few outliers in some study cells, but they were again considered as genuinely occurring data.

Next, the four recovery experiences were added to the model as control variables. All of them significantly predicted need for recovery ($p < .001$). When psychological detachment was kept

constant the people working in information and communication, and educational industries had significantly lower need for recovery than people working in accommodation and food service industry ($p < .01$). Thus, need for recovery within educational industry dropped in one of the lowest levels, whereas, in the original model, it was one of the highest. It seems therefore that the lack of psychological detachment within educational industry compared to the other industries contributed to the high levels of need for recovery within educational industry.

When relaxation was used as the control variable the assumption of homogeneity of regression slopes was violated. It indicates that the effect of relaxation might not be the same in different industries. Regardless, it was continued with the analysis, and it was found out that the results were equivalent with the results when controlling for psychological detachment. That is, information and communication, and educational industries had significantly lower levels of need for recovery than accommodation and food service industry ($p < .01$). Hence, it seems that low relaxation levels also contributed to the high levels of need for recovery in educational industry when compared to the other industries.

The control of mastery did not make any differences to the original results. However, when controlling for control during off-job time, it resulted again to equivalent results than when controlling for psychological detachment and relaxation. That is, information and communication, and educational industries had again significantly lower levels of need for recovery than accommodation and food service industry, although the difference between educational industry, and accommodation and food service industry was this time a bit weaker ($p < .05$). Then, also low levels of control during off-job time seemed to contribute somewhat to the high levels of need for recovery within educational industry when compared to the other industries. It should be mentioned lastly that the assumption of normal distribution of the dependent variable was again violated within information and communication industry when all of the recovery experiences were controlled, and also within educational organisation when mastery was controlled.

All job demand variables significantly predicted need for recovery as well ($p < .01$ for Weekly working hours; $p < .001$ for Time demands, Demands in decision making, Physical demands, and Job insecurity). When weekly working hours, and demands in decision making were kept constant (one by one) there was a significant difference only between information and communication, and accommodation and food service industries ($p < .01$). In other words, the level of need for recovery was significantly lower in information and communication industry than in accommodation and food

service industry. It indicates that both the high weekly working hours, and the high level of demands in decision making within educational industry contributed to the high level of need for recovery within this industry, since it did not differ anymore significantly from information and communication industry.

When time demands were controlled a significant difference in need for recovery was found this time only between educational industry, and accommodation and food service industry ($p < .05$). Educational industry had thus significantly lower levels of need for recovery than accommodation and food service industry, and this indicates, first of all, that high level of time demands had, as well, an effect on need for recovery scores among people working in educational industry. Further, since there were no differences between information and communication industry, and the other industries anymore, when time demands were controlled, it indicates that a lack of time demands contributed to the low level of need for recovery within information and communication industry.

The control of job insecurity did not change the original outcome, except the difference between information and communication, and accommodation and food service industries was even stronger ($p < .001$). The control of physical demands, on the other hand, made quite a difference to the original outcome. That is, in this case, retail trade industry, information and communication industry, and travel services industry had all significantly lower need for recovery than educational industry ($p < .01$, $p < .01$, $p < .05$ accordingly). Consequently, it seems that the high level of physical demands contributed to the high level of need for recovery within accommodation and food service industry, since there were no differences in need for recovery between information and communication, and accommodation and food service industries anymore. Also, since retail trade and travel services industries were among the bottom industries regarding need for recovery, when physical demands were controlled, it seems that high physical demands increased the levels of need for recovery within these industries. It should be noted again that the assumption of normal distribution was not met in the case of information and communication industry when all of the job demands were controlled, and also in the case of accommodation and food service, when time demands were controlled, and in the case of education, when job insecurity was controlled.

Finally, all the job resource variables also significantly predicted need for recovery ($p < .001$), and they all made quite a difference to the original outcome as well. First, when control at work was kept constant the differences between industries were equivalent to the differences when physical demands were controlled. In other words, retail trade industry, information and communication industry, and

air travel services industry all had significantly lower need for recovery than educational industry ($p < .001$, $p < .01$, $p < .05$ accordingly). This translates to the indication that the low score on control at work explains in part the high scores on need for recovery within accommodation and food service industry, since there was not a significant difference in need for recovery between information and communication, and accommodation and food service industries, when control at work was controlled. Similarly, low scores on control at work seemed to affect to the scores on need for recovery within retail trade and air travel services, since these industries had significantly lower need for recovery than educational industry, when control at work was kept constant.

When support from supervisor was controlled, retail trade, information and communication, and educational industries had significantly lower need for recovery than accommodation and food service industry ($p < .01$, $p < .01$, $p < .05$ respectively). It seems then that the lack of support from supervisor, as compared to other industries, contributed to the high need for recovery within educational industry, since there were no more a difference between information and communication, and educational industries, when support from supervisor was controlled. At the same time, the lack of support from supervisor, as compared to the other industries, seemed to contribute to the levels of need for recovery within retail trade industry as well, since there was a significant difference now between retail trade, and accommodation and food service industries.

At last, when support from co-workers and justice of the supervisor were controlled, the differences in need for recovery were found to be between retail trade, and accommodation and food service industries, and between information and communication, and accommodation and food service industries. More closely, when support from co-workers was kept constant, both retail trade industry and information and communication industry had significantly lower need for recovery than accommodation and food service industry ($p < .05$, $p < .01$ respectively), and similarly when justice of the supervisor was kept constant, both retail trade, and information and communication industries had significantly lower need for recovery than accommodation and food service industry ($p < .01$, $p < .001$ accordingly). The average score on both of these job resource variables were one of the lowest within retail trade industry, which explains why retail trade industry had significantly lower need for recovery than accommodation and food service industry, when these job resource variables were controlled. Also, low scores on these job resource variables within educational industry explains in this case, why there was no more a significant difference on need for recovery between information and communication, and educational industries. Lack of support from co-workers and justice of the supervisor, in other words, seemed to affect to the need for recovery scores within retail trade and

educational industries. On the other hand, there was almost a significant difference between information and communication, and educational industries when justice of the supervisor was controlled, so the effect of this job resource variable was not as strong in this case. It is also worth to mention that the assumption of normal distribution was not met within information and communication industry in case of all of the job resource variables either and, not either within educational organisation when justice of the supervisor was used as the control variable.

3.2 Interaction between industry and psychological detachment on need for recovery

3.2.1 Descriptive statistics

Table 3. Means and standard deviations of need for recovery and sample size by industry and the levels of detachment

Recovery experience	Industry														
	Retail trade			Information and communication			Accomm. and food services			Air travel services			Education		
Detachment	M	SD	N	M	SD	N	M	SD	N	M	SD	N	M	SD	N
Low	2.51	0.53	17	2.33	0.63	20	2.52	0.55	38	2.56	0.53	14	2.36	0.51	183
High	1.90	0.42	38	1.77	0.42	39	2.15	0.52	48	2.02	0.47	33	1.98	0.49	92

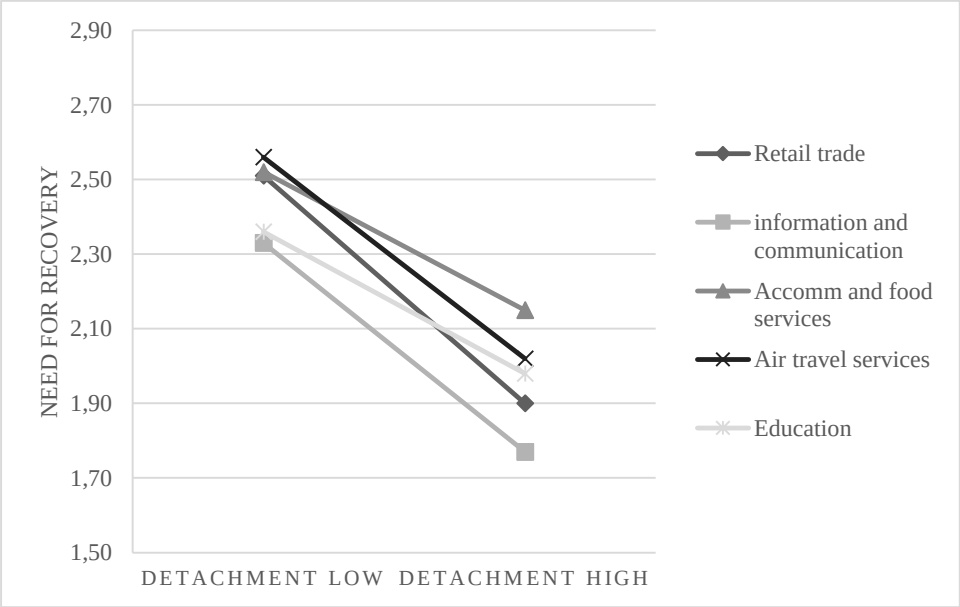

Figure 3. Line graph on need for recovery by industry and the levels of detachment

Table 3 shows the means and standard deviations of need for recovery, and the number of participants within each group formed by the levels of detachment and the five industries. It can be seen that need for recovery is lower within groups of high detachment compared to low detachment in every industry, which indicates that the recovery experience of detachment has an effect on need for recovery in every industrial group. Thus, it seems people with high detachment score lower on need for recovery compared to people with low detachment regardless of the industry they work for. Standard deviations do not differ much between the groups. There seem to be more participants within high detachment. Except, in the educational organisation the sample size is much larger within low detachment.

Figure 3 represents a line graph on the means of need for recovery by the levels of detachment and by the five industries. The lines go fairly in the same direction. However, need for recovery within both accommodation and food service, and educational industries seem to decline less steeper from low detachment to high detachment, when compared to the other industries, indicating that the effect of detachment might be smaller within these two industries compared to the other industries.

3.2.2 Inferential statistics

Couple of outliers were detected within information and communication industry with high detachment, accommodation and food service industry with high detachment, Air travel services industry with both groups of detachment, and education industry with high detachment, as assessed as being three box-lengths from the edge of the box in a boxplot. All these outliers were, however, genuinely unusual values, and as stated above, this kind of extreme values cannot actually be regarded as outliers within the 4-point scale measure used in the dependent variable of this study, so they were included in the analysis.

There were two cells that did not meet the requirement of normal distribution of the need for recovery as assessed by Shapiro-Wilk test ($p < .05$). These were the information and communication industry with high detachment, and the educational industry with low detachment. Because it was only these two cells, and transformation of data did not help with this problem, it was decided to continue regardless. Levene's test of homogeneity of variances confirmed there was homogeneity of variances across the groups ($p > .05$).

The two-way ANOVA showed both of the main effects to be significant. That is, need for recovery was significantly lower when there was high detachment than compared to low detachment ($F(1,512) = 73.45$, $p < .001$). Also, there were significant differences on need for recovery between the industries ($F(4,512) = 3.18$, $p < .05$), but we will not go into detail with these differences here, since they were already addressed in the previous chapter. No interaction effect was found between the factors of detachment and organisation ($F(4,512) = 0.91$, $p > .05$). Hence, there were no differences in the way detachment affected need for recovery depending on the industry.

3.3 Interaction between industry and relaxation on need for recovery

3.3.1 Descriptive statistics

Table 4. Means and standard deviations of need for recovery and sample size by industry and the levels of relaxation

Recovery experience	Industry														
	Retail trade			Information and communication			Accomm. and food services			Air travel services			Education		
Relaxation	M	SD	N	M	SD	N	M	SD	N	M	SD	N	M	SD	N
Low	2.54	0.49	16	2.23	0.56	18	2.44	0.57	31	2.55	0.52	17	2.37	0.52	174
High	1.90	0.45	39	1.84	0.54	41	2.24	0.54	55	1.97	0.45	30	2.00	0.47	101

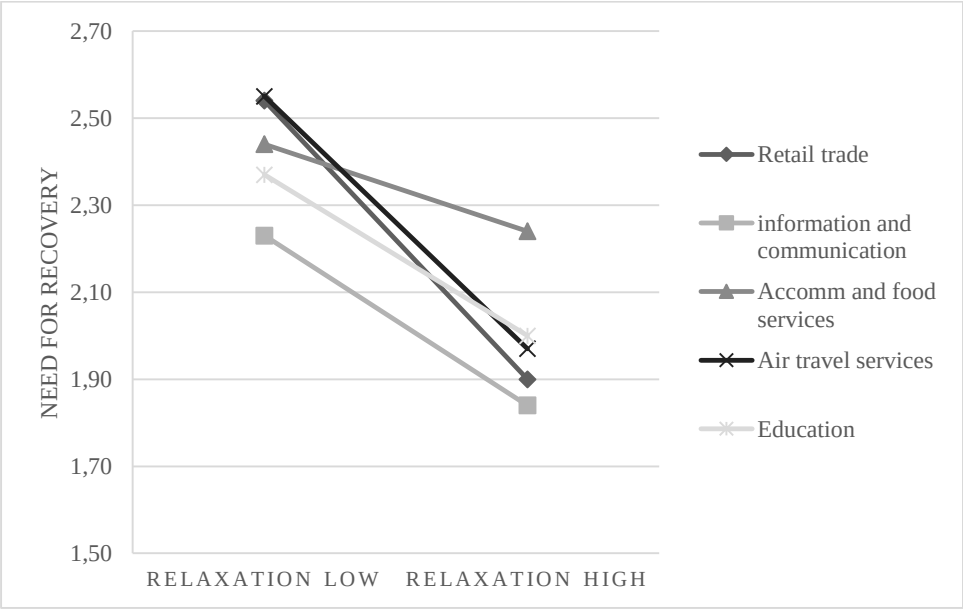

Figure 4. Line graph on need for recovery by industry and the levels of relaxation

Table 4 shows the means and standard deviations of need for recovery, and the number of participants by the levels of relaxation and the five industries. There is again a noticeable difference between low relaxation groups and high relaxation groups in need for recovery, as was the case with detachment. In high relaxation groups, the need for recovery is much lower than in the low relaxation groups in every study industry. The standard deviations do not differ much between the groups, but the sample size is larger with high relaxation when compared to low relaxation in every industry, except in education.

Figure 4 shows a possible interaction effect on need for recovery between industry and relaxation. The figure presents a line graph based on means of need for recovery for each industry by low relaxation and high relaxation. The differences on need for recovery from low relaxation to high relaxation seem to be greatest within retail trade, and air travel services. The difference within accommodation and food services seems to be, on the other hand, the smallest, and air travel services and educational industries lie somewhere there between.

3.3.2 Inferential statistics

There were again couple of outliers within information and communication industry with high relaxation, accommodation and food service industry with high relaxation, Air travel services industry with both groups of relaxation, and education industry with high relaxation. All the outliers were again naturally occurring data, and therefore, they were included in the analysis.

The only group that did not meet the assumption of normal distribution was information and communication industry with high relaxation ($p < .05$). Within all other groups the dependent variable of need for recovery was approximately normally distributed as assessed by Shapiro-Wilk test ($p > .05$). The data met the assumption of homogeneity of variances.

The two-way ANOVA showed a significant main effect for the factor relaxation. That is, need for recovery was significantly lower with high relaxation when compared to low relaxation ($F(1,512) = 55.83$, $p < .001$). The significant difference in need for recovery between the industries was also detected ($F(4,512) = 3.02$, $p < .05$). A significant interaction effect was not found between the factors of relaxation and industry ($F(4,512) = 1.71$, $p > .05$). That is, also relaxation affected need for recovery similarly regardless of the industry.

3.4 Interaction between industry and mastery on need for recovery

3.4.1 Descriptive statistics

Table 5. Means and standard deviations of need for recovery and sample size by industry and the levels of mastery

Recovery experience	Industry														
	Retail trade			Information and communication			Accomm and food services			Air travel services			Education		
Mastery	M	SD	N	M	SD	N	M	SD	N	M	SD	N	M	SD	N
Low	2.15	0.65	19	2.06	0.49	22	2.43	0.59	49	2.40	0.47	21	2.26	0.51	117
High	2.05	0.48	36	1.90	0.61	37	2.16	0.49	37	2.00	0.54	26	2.20	0.55	158

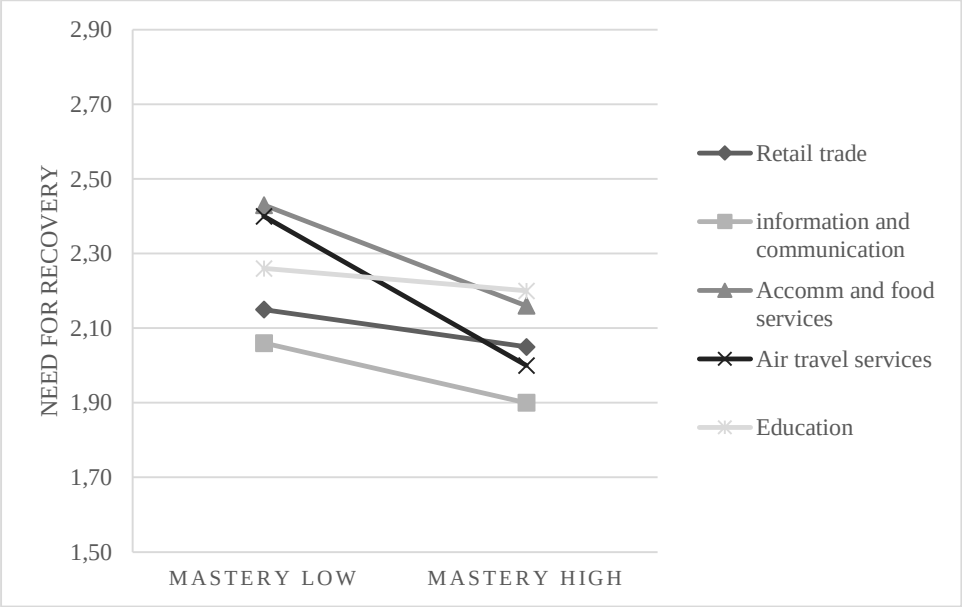

Figure 5. Line graph on need for recovery by industry and the levels of mastery

Table 5 shows the means and standard deviations of need for recovery by industry and the levels of mastery. There seem to be a difference in need for recovery between low and high mastery, with low mastery group having higher level of need for recovery, but the difference seem not to be as prominent as with the other recovery experiences above. The standard deviation does not differ much again between the groups. The number of participants is now larger in high mastery groups within all other industries except within accommodation and food services.

The line graph in Figure 5 presents the means of need for recovery for each industry by the levels of mastery. Here, the difference between low and high mastery on need for recovery seem to be much bigger in air travel services, and accommodation and food service industries than compared to the other industries, suggesting therefore a possible interaction effect.

3.4.2 Inferential statistics

One outlier was detected within both retail trade with high mastery, and air travel services with high mastery. Additionally, there were couple of outliers within information and communication with high mastery, and education with low mastery. They were all again genuinely unusual values.

Only one cell of the study design, that is the cell of information and communication industry with high mastery, violated the assumption of normal distribution of the dependent variable as assessed by the Shapiro-Wilk test ($p < .05$). The homogeneity of variances was met.

The analysis of two-way ANOVA confirmed, that both of the main effects were supported. First, the need for recovery was significantly lower with high mastery when compared to low mastery ($F(1,512) = 11.04$, $p < .01$). Then, there was a significant difference on need for recovery between the industries ($F(4,512) = 3.57$, $p < .01$). But, no significant interaction was found between the factors of mastery and industry ($F(4,512) = 1.37$, $p > .05$). Mastery thus had a similar effect on need for recovery within each industry.

3.5 Interaction between industry and control during off-job time on need for recovery

3.5.1 Descriptive statistics

Table 6 presents means and standard deviations of need for recovery, and the number of participants in each group formed by the levels of control during off-job time and the industries. It can be seen that need for recovery is considerably lower with high control when compared to low control across all industries. Standard deviations do not differ much between groups, but the number of participants in the low control groups is lower than in high control groups, except within educational industry where it is the opposite.

Table 6. Means and standard deviations of need for recovery and sample size by industry and the levels of control during off-job time

Recovery experience	Industry														
	Retail trade			Information and communication			Accomm and food services			Air travel services			Education		
Control	M	SD	N	M	SD	N	M	SD	N	M	SD	N	M	SD	N
Low	2.35	0.53	17	2.28	0.59	20	2.46	0.56	32	2.42	0.49	16	2.36	0.53	163
High	1.97	0.51	38	1.80	0.48	39	2.22	0.55	54	2.06	0.54	31	2.04	0.48	112

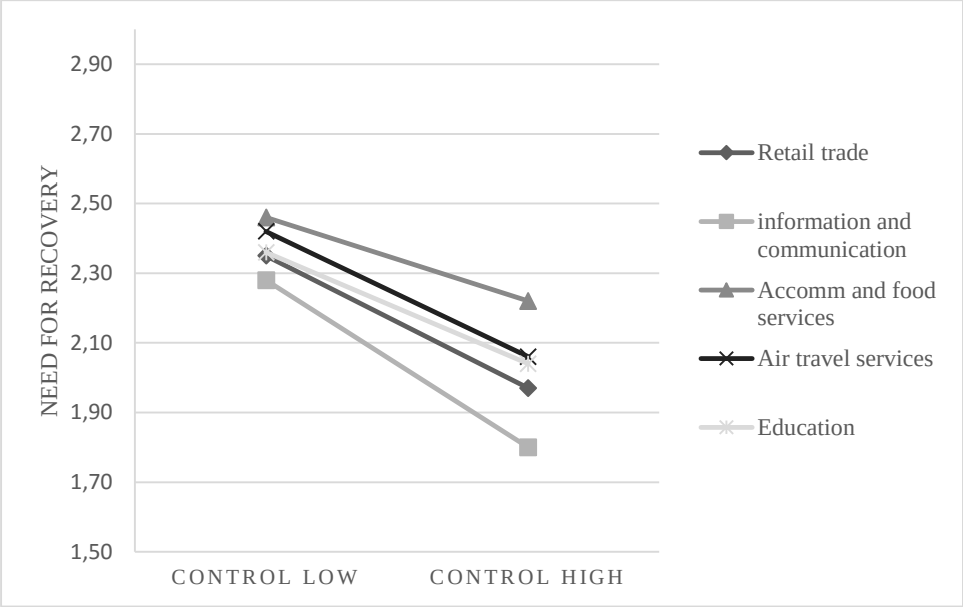

Figure 6. Line graph on need for recovery by industry and the levels of control during off-job time

Figure 6 shows the line graph on the means of need for recovery by the levels of control during off-job time and the industries. From the figure, it can be seen that there are not much of an interaction between the recovery experience of control during off-job time and the industries. That is, the lines representing the industries lower to quite the same direction from low control to high control. However, the information and communication industry seems to have the biggest difference in need for recovery between low and high control, and accommodation and food service industry, on the other hand, seems to have the smallest difference. And overall, within low control the industries seem to be more or less in the same level of need for recovery, but within high control there are more variation between the industries.

3.5.2 Inferential statistics

There was just one outlier within each group of information and communication industry with high control, accommodation and food service industry with high control, air travel services industry with high control, and education industry with high control. However, these were again all naturally occurring scores.

The assumption of normality, as assessed by Shapiro-Wilk test, was violated in one cell of the study design ($p > .05$). This cell was information and communication industry with high control during off-job time. The assumption of homogeneity of variances was not violated.

The two-way ANOVA confirmed that the main effect of control during off-job time was supported. That is, need for recovery was significantly lower within high control than compared to low control ($F(1,512) = 36.80$, $p < .001$). Also, there was a significant difference in need for recovery between the industries ($F(4,512) = 2.84$, $p < .05$) No significant interaction effect was found between the factors of control during off-job time and industry type ($F(4,512) = 0.50$, $p > .05$). Hence, also the recovery experience of control during off-job time affected need for recovery regardless of the industry.

4 Discussion

The study aimed to compare recovery from work strain between different industries. In other words, since work characteristics of job demands and resources have been found to affect recovery (e.g. Sonnentag & Fritz, 2007; Siltaloppi et al., 2009; Kinnunen et al., 2011), the aim was to find out whether different patterns of these work characteristics translate to differences in recovery between different industries. In addition, the study aimed to uncover the characteristics that contribute to the differences in the recovery outcome. Similarly, age, gender, and the recovery experiences were also controlled to test whether they contribute to the differences in recovery. Lastly, the aim was to find out whether the four recovery experiences, psychological detachment, relaxation, mastery, and control during off-job time, have different roles depending on the industry people work in. That is, it was tested whether the recovery experiences interact with the type of industry on the effect on need for recovery.

The following discussion will first summarise the results of the study. Then, it will follow a discussion about the differences in recovery between the industries, which will also point out the factors that contribute to the differences. Next, there will be a discussion about the universality of recovery experiences across different industries. Lastly, the discussion will end to the evaluation of the study and to a conclusion.

4.1 Overall summary of the study results

First of all, the results showed that there were differences in need for recovery between the study industries, but these differences varied when controlling for the recovery experiences, job demands and resources, and age and gender, drawing thus a picture of how these antecedents of recovery contribute to the recovery outcome within different industries. The second part of analyses confirmed the previously well proved effect of recovery experiences on recovery. More specifically, it was found that need for recovery was significantly lower with higher levels of each four recovery experiences than with lower levels of the experiences. The recovery experiences were not, however, found to interact with the type of industry. The effect of recovery experiences on recovery was thus similar across all industries suggesting a somewhat universal nature for the recovery process across industries.

4.2 Some industries differ in regards of employers' recovery from job strain

As can be seen, the results of the current study are partly in contradiction with the results Sonnentag and Bayer (2005) found in their study. They found no differences in occupational well-being measures between different industries. In this study, on the other hand, some differences in need for recovery were demonstrated between industries. More specifically, it was found that the people working within industry of information and communication recovers from work strain better than people within both industries of education and accommodation, and food service activities.

In the current study, there were somewhat different industries than in the Sonnentag and Bayer (2005) study. For instance, either information and communication industry, or accommodation and food service industry were not represented in Sonnentag and Bayer's (2005) study. This might be one explanation for why there were not any differences found in the study of Sonnetag and Bayer (2005), and why in the current study, on the other hand, such differences were revealed. It might thus be that the industries of information and communication, and accommodation and food services represent the opposite extremes when it comes to recovery from work strain, and in the study of Sonnentag and Bayer (2005) the industries included were not just that different from each other in job situational factors.

At the same time, Sonnentag and Bayer (2005) used different outcome factors in the comparison. That is, they compared their industries in well-being measures, such as positive mood and fatigue, and in psychological detachment. They did not use any specific recovery outcome measure. It might thus be that the comparison of the current study resulted into differences between industries since the measure used was need for recovery. Since need for recovery has been associated as being an early sign of strain effects (Sonnentag & Ziljzra, 2006), it might be that differences in recovery between different industry groups are revealed with this early sign, but in longer term strain, the effects become steadier across industries.

Furthermore, it should be mentioned that the sample size in the study of Sonnentag and Bayer (2005) was only 87, and it was divided into seven industry groups. Therefore, it might also be that differences could not be revealed in their study because of the small sizes of the study groups, and the bigger sample of the current study made the comparison of the industries reveal well-being differences.

Apart from revealing recovery differences between industries, the current study also revealed which job situational factors lie behind these differences. Educational industry was overall the worst off with the job demands. That is to say, the high levels of the job demands of weekly working hours, time demands, and demands in decision making all contributed to the high level of need for recovery among people working in educational industry. This result goes well together with the results of Siltaloppi et al. (2009) and Kinnunen et al. (2011), since they demonstrated the positive relationship between these job demand factors and need for recovery.

Also, the current study was in line with the research by Bakker et al. (2005) which demonstrated the relationship between physical demands and burnout, only in the current study the well-being outcome was need for recovery. Physical demands thus increased the need for recovery levels in industries of accommodation and food services, retail trade, and air travel services.

Job insecurity, on the other hand, did not seem to affect much to the differences between the study industries, although it has also been found to be positively related to need for recovery in earlier research (Kinnunen et al. 2010). It might be that job insecurity did not just differ that much between the industries, and for that reason, it did not contribute to the differences in need for recovery. On the contrary, it might as well be that job insecurity did not have as strong relationship with need for recovery as the other job demand factors.

Job resources have instead been found to have negative relationship with need for recovery in previous studies (e.g. Siltaloppi, et al. 2009; Kinnunen, et al. 2011), and this relationship also revealed itself in the differences in this study with all of the job resources measured. More closely, low levels on control at work increased need for recovery in accommodation and food services industry, retail trade industry, and air travel services industry. Lack of support from supervisor, lack of support from co-workers, and lack of justice of the supervisor all affected need for recovery both in retail trade and education industries. Interestingly, the control of the job resources did not change the position of information and communication industry as one of the best off with need for recovery, although information and communication industry had overall the highest level of job resources. It could be that not just one job resource factor contributed to the low level of need for recovery on its own, but all of them together.

In case of the recovery experiences, the educational industry seemed to be the most affected by them. More closely, the lack of psychological detachment, relaxation, and control during off-job time all contributed to the increased level of need for recovery, as compared to the other industries. This is in line with the studies demonstrating the negative relationship between recovery experiences and need for recovery (e.g. Sonnentag & Fritz, 2007; Siltaloppi et al., 2009; Kinnunen et al., 2011). Mastery was not, however, found to affect to the differences in need for recovery between the industries. It could be that the industries just did not differ enough from each other regarding mastery, and the descriptive statistics also suggest so. On the other hand, mastery has been shown to act more on the motivational process of Job Demands-Resources model, and affect more on work engagement factors than on job fatigue factors, such as need for recovery (Kinnunen et al., 2011). Hence, it might as well be that the effect of mastery on need for recovery is not just as strong as with the other recovery experiences, and that is why it did not contribute to the differences between the industries.

Surprisingly, age did not statistically significantly predict need for recovery in the current study, and there were neither any significant differences in need for recovery between women and men, although Kinnunen et al. (2009) found both age and gender to be related with need for recovery. However, both of them seemed to somewhat affect to the differences in need for recovery between the industries, and these effects were in line with the study of Kinnunen et al. (2009). First, the high average age in educational industry was found to contribute to the high level on need for recovery within this industry. Then in the case of gender, it was found that there was a significant interaction between gender and the industry type. More closely, it was found that women had significantly higher need for recovery than men in educational industry, but not in other industries. Also, there were no differences in need for recovery between industries among men, but among women the most predominantly male industries of retail trade, and information and communication had both significantly lower need for recovery than one of the most predominantly female industries, that is education industry. The women working in information and communication industry had also significantly lower need for recovery than the women in accommodation and food services industry, which was the most predominantly female industry. Women seemed to be thus more prone to high need for recovery than men as was demonstrated in the study of Kinnunen et al. (2009) as well. It could also be that the job demands and resources affect women differently than men and thus contribute to the different effect on need for recovery across industries. This is something that would be beneficial to study further.

The results described in this section give some practical implications. That is, the descriptions above shed light on what the situation is in each industry in regards of need for recovery and its antecedents, and it might give suggestions on what to pay attention to as to enhance recovery and well-being in general. For example, need for recovery in educational industry was affected by several factors, especially high job demands and lack of most of the recovery experiences, and thus there might be, or more appropriately, must be something that could be done to enhance these deficiencies to enhance recovery among the people working in this industry.

It should be highlighted that the effects of the control variables described above are really descriptive in nature, and they aim only to show a picture of how the situational factors contribute to the differences in recovery between industries, and not actual interactions could be interpreted. Only gender was tested within an interactional design, since it was naturally categorical variable. It could be beneficial also to test whether the other job situational factors similarly interact with different industries, and go more in depth into the effects of job situational factors on need for recovery across different industries. In fact, the other set of the analyses did this in regards of the recovery experiences, and the results of these analyses will be discussed next.

4.3 The recovery experiences affect recovery from job strain regardless of the industry

The current study, once again, demonstrated the importance of recovery experiences (psychological detachment, relaxation, mastery, and control during off-job time) acting as mechanisms for better recovery from work stress. Thus, this finding is naturally in line with what Sonnentag and Fritz (2007), and Pennonen (2011) have highlighted earlier. Here, it was, in addition, demonstrated with comparative design. That is, recovery could be considered to be better within groups of high levels of each four recovery experiences compared to groups of lower levels of the recovery experiences.

Because previous studies have demonstrated that there is a strong connection between job situational characteristics and recovery experiences (e.g. Sonnentag & Fritz, 2007; Siltaloppi et al., 2009; Kinnunen et al., 2011), it was expected that this would translate as different levels of effects of the recovery experiences on recovery across different industries. However, no interaction effect was detected between any of the recovery experiences and the type of industry, which also makes this study to be partly in line with the study of Sonnentag and Bayer (2005), which did not find any interaction between psychological detachment and well-being measures. Hence, it could be interpreted that the effect of all the recovery experiences of detachment, relaxation, mastery, and

control during off-job time, is fairly independent of the industry, although descriptively, the industries seem to be quite different from each other in job situational factors, as demonstrated above.

Although no significant interaction was detected, descriptively there are some differences in the effects of recovery experiences. Specifically, since Kinnunen et al. (2011) found psychological detachment to mediate the effects of job demands on fatigue at work (measured also as need for recovery), it was expected that the effect of psychological detachment would be stronger in industries with lower job demands, and on the contrary, weaker in industries with higher demands. The mediation effect seemed to show itself at least as the weakest effect of psychological detachment in the industry of education. That is, educational industry had clearly overall the highest job demands, and this seemed to lead to lower levels of psychological detachment, which also descriptively showed as the weakest effect of psychological detachment on recovery when compared to the other industries. In regards of the lower job demands, the result was not as clear, since there were not just one industry scoring overall the lowest with the job demand factors.

Also, it could not be ignored that in the first set of analysis the regression slopes were not found to be homogenous in regards of relaxation, which suggests possible different kinds of effects of relaxation across the industries. In the descriptive statistics, it can be seen that there is barely any difference in need for recovery between the levels of relaxation in accommodation and food service industry when compared to the other industries. Since especially physical demands were found to affect to the high score on need for recovery in the accommodation and food service industry, it might be that relaxation could actually mediate the effect of physical demands. That is, high physical demands might lead to poor relaxation experiences, which, in turn, lead to poor recovery. This is one thing that might be beneficial to study further. Kinnunen et al. (2011) did not include physical demands in their study, which might explain why no mediation effect was found with relaxation on recovery in their study.

Nevertheless, the current study did not find any significant interaction between the industries and the recovery experiences, not even with relaxation. It could be that the industries were not just different enough on the job situational characteristics to lead to any different effects of the recovery experiences. However, the reason for non-existent interactions might lie in the study design as well. That is to say, the groups of different levels of recovery experiences were created by dividing the participants into two groups by the median, and the median score was quite high in most of the recovery experiences. This indicates that the high levels of the recovery experiences were over

represented when compared to low scores on these factors, and this might have affected to the results. The study could be then better to replicate with even bigger sample when also the lower scores on the recovery experience scale would be better represented, and the groups of low and high recovery experiences might be more distinct from each other.

Overall however, it is quite safe to say that all of the recovery experiences are effective mechanisms towards better recovery in all industries, since their effect is also well proved previously (e.g. Sonnentag and Fritz, 2007; Pennonen, 2011). Descriptively, there are some differences between industries, and thus it might be beneficial within each industry to find out which of the recovery experiences best predicts recovery among their employees. More closely, companies could define the most suitable recovery experiences, for example by regression analysis, for each employee group, and then promote rest break activities that enhance those experiences, and also give such suggestions for spare time activities after a work day. This rises, on the other hand, the question on the equality of the recovery experiences. Does it depend on the environment which of the recovery experiences is the most suitable mechanism towards better recovery, or are they all equally important towards the best possible recovery and health benefits? In practice, should the recovery experience, which predicts recovery the best, to be enhanced, or should the recovery experiences, in which the employees score the lowest, or the situational factors that contribute to the low levels of these recovery experiences, to be enhanced? That is again one thing that should be taken into consideration in future research. Since the recovery experiences have been found to be related to somewhat different well-being outcomes (e.g. Sonnentag & Fritz, 2007; Siltaloppi et al. 2009), the latter might be more convincing.

4.4 Evaluation of the study

The study had some flaws and limitations that should be considered. Some of them have already been mentioned above, such as the overrepresentation of high scores in recovery experiences, but here more limitations due to the study design and sample will be discussed.

First, the study used cross-sectional and quasi-experimental design. That is, the industrial groups were naturally occurring as they were, but also the groups of low and high levels of each recovery experience were formed by the scores the participants got in the recovery experience measure. No random allocation was used. However, since the differences between the levels of each recovery experience were so prominent and consistent throughout the study, and their effect has been well demonstrated in previous studies as well, it could be quite safe to say that there were true effects of

the recovery experiences. To increase reliability, the study could be replicated with longitudinal data as well.

Secondly, filling out the survey for the research project was naturally optional, and that might have led to so called pre-self-selection of the participants. For example, the group of least recovered might have been selected out from the survey, which might have led to the study not giving quite truthful picture of the phenomenon. In addition, self-report measures were used. It would be considered a suitable method in this study, since the aim was to study specifically the experienced recovery of the participants, but for example, physical measures on the side might give more reliable results on the actual recovery.

Most importantly, it should be mentioned that the study could also be called, in fact, a comparative case study, since only one organisation were used to represent each industry type. Therefore, much cation should be taken when generalising the results to consider the industries overall in the country, or especially in the whole world. The study organisations could be, however, compared to the official national statistics of the industries in question in regards of age, gender, and educational level. The study organisations were considered to be quite well compared to the national statistics with these measures. There were mainly some differences within industries, but the distributions between industries were quite in balance. However, when the sample sizes of the study organisations were compared to the overall number of employees in the industries in the country, it was noticed that the industry of accommodation and food services was, for instance, overrepresented in the study, and retail trade industry, on the other hand, was way underrepresented. Also, within the study organisations, there were quite a lot more participants in the educational industry compared to the other industries. With bigger sample, and maybe by sampling proportionally with the official number of employees, the results might be more reliable and generalizable.

Furthermore, the participants within every industry were a varied collection of basic employees, managers, and specialists. Thus, the work situations and tasks might have varied considerably within the industries as well. If the sample could have been limited to include just one level of employee group, the differences between industries might have become more apparent. But, cropping of the sample was not possible because of the already quite small sample regarding most of the industries. The work position could have also been used as control variable, hence this should be considered in future studies as well.

To the limitations should also be added the fact that this study used only need for recovery as the dependent variable. Future studies should therefore replicate this kind of comparative design with other occupational well-being outcome variables. Especially, since Kinnunen et al. (2011) actually found mastery to act in the motivational process of Job Demands- Resources model by mediating the effect of job resources on work engagement, the study could be replicated with work engagement as dependent variable, and perhaps then an interaction might be found between mastery and the type of industry.

At last, some of the assumptions of the analyses were also violated. However, these violations mainly concerned only few of the study cells, and it is quite uncommon to have all the assumptions of this kind of study analysis met, especially with so many variables included and with naturally occurring data. Still, some caution should be kept in mind when generalising the results to bigger populations.

4.5 Conclusion

Despite the limitations, the current study demonstrated that job situational factors really matter when it comes to recovery. That is, in an industrial level, there are differences how people experience their need for recovery, and what factors contribute to the levels of recovery. In other words, the study gives a practical view of how recovery from work stress function in an industrial level, and what role different factors play in different industries. Overall, it seems that at least education industry has got a lot of work to do to enhance their employees' recovery and the overall well-being. Based on this study, information and communication industry could, on the other hand, sigh from relief, since the people working in this industry seem to be in quite safe waters regarding recovery from job strain, when compared to other industries.

Furthermore, the study confirmed the effect of recovery experiences in a comparative design, and thus strengthened further their importance in the work recovery literature. Additionally, it demonstrated that the recovery experiences really act universally to enhance recovery regardless of the industry people work in. Descriptively all four recovery experiences work slightly differently depending on the industry, and it gives thus companies a practical suggestion to customise daily break activities for different employee groups for better recovery and enhanced performance. One question though remains to be fully answered, that is: Are the recovery experiences equally important and necessary in all situations for to enhance recovery, or could just one of them be enough to do the trick depending on the situational factors?

References

Bakker, A.B., Demerouti, E., & Euwema, M.C. (2005). Job resources buffer the impact of job demands on burnout. *Journal of Occupational Health Psychology,* 10(2), 170–180. doi: 10.1037/1076-8998.10.2.170

Buunk, B. P., de Jonge, J., Ybema, J. F., & de Wolff, C. J. (1998). Psychological aspects of occupational stress. In P. J. D. Drenth, H. Thierry & C. J. de Wolf (Eds.), *Handbook of work and organizational psychology: Work psychology,* 2nd ed., p. 148. Hove UK: Psychology Press.

Demerouti, E., Bakker, A.B., Geurts, S.A.E., & Taris, T.W. (2009). Daily recovery from work-related effort during non-work time. *Current Perspectives on Job-Stress Recovery Research in Occupational Stress and Well Being,* 7, 85–123. doi: 10.1108/S1479-3555(2009)0000007006

Demerouti, E., Bakker, A.B., Nachreiner, F., & Schaufeli, W.B. (2001). The Job Demands-Resources model of burnout. *Journal of Applied Psychology,* 86(3), 499–512. doi: 10.1037//0021-9010.86.3.499

de Bloom, J., Geurts, S.A.E., Taris, T.W., Sonnentag, S., de Weerth, C., & Kompier, M.A.J. (2010). Effects of vacation from work on health and well-being: Lots of fun, quickly gone. *Work & Stress,* 24(2), 196–216. doi: 10.1080/02678373.2010.493385

Elo, A-L., Dallner, M., Gamberale, F., Hottinen, V., Knardahl, S., Lindström, K., Skogstad, A., & Orhede E. (2001). QPSNordig-käsikirja. Pohjoismainen työn psyykkisten ja sosiaalisten tekijöiden yleiskysely. Helsinki: Työterveyslaitos.

Eurostat (2008). Statistical Classification of Economic Activities in the European Community, Rev. 2. Retrieved December 2, 2015, from http://ec.europa.eu/eurostat/ramon/nomenclatures/index.cfm?TargetUrl=LST_NOM_DTL&StrNom=NACE_REV2&StrLanguageCode=EN&IntPcKey=&StrLayoutCode=HIERARCHIC

Fehrmann, C., & Depenbrock, F. (2014). Recovery from work-related stress: A literature review. *Maastricht Student Journal of Psychology & Neuroscience*, 3, 85–96. Retrieved April 8, 2015, from http://openjournals.maastrichtuniversity.nl/MSJPN/article/view/58/42 26.3.2015

Fritz, C., & Sonnentag, S. (2005). Recovery, health, and job performance: Effects of weekend experiences. *Journal of Occupational Health Psychology*, 10(3), 187–199. doi: 10.1037/1076-8998.10.3.187

Fritz, C., & Sonnentag, S. (2006). Recovery, well-being, and performance-related outcomes: The role of workload and vacation experiences. *Journal of Applied Psychology*, 91(4), 936–945. doi: 10.1037/0021-9010.91.4.936

Geurts, S. A. E., & Sonnentag, S. (2006). Recovery as an explanatory mechanism in the relation between acute stress reactions and chronic health impairment. *Scandinavian Journal of Work, Environment and Health, 32*(6), 482–492. doi: 10.5271/sjweh.1053

Griffin, J. M., Fuhrer, R., Stansfeld, S. A., & Marmot, M. (2002). The importance of low control at work and home on depression and anxiety: Do these effects vary by gender and social class? *Social Science and Medicine, 54*(5), 783–798. Retrieved April 8, 2015, from http://search.proquest.com/docview/60441782?accountid=136582

Hobfoll, S. E. (1989). Conservation of resources: A new attempt at conceptualizing stress. *American Psychologist, 44*(3), 513–524. doi: 10.1037/0003-066X.44.3.513

Härmä, M. (2006). Workhours in relation to work stress, recovery and health. *Scandinavian Journal of Work, Environment & Health,* 32(6), 502–514. doi: 10.5271/sjweh.1055

Julkunen, R. (2008). *Uuden työn paradoksit -keskusteluja 2000-luvun työprosesseista*, pp. 11–12. Tampere: Vastapaino.

Karasek, R.A. jr. (1979). Job demands, job decision latitude, and mental strain: Implications for job redesign. *Administrative Science Quarterly,* 24(2), 285–308. Retrieved March 29, 2015, from http://www.jstor.org/stable/

Kinnunen, U., & Feldt, T. (2013). Job characteristics, recovery experiences and occupational well-being: Testing cross-lagged relationships across 1 Year. *Stress & Health*, 29, 369–382. doi: 10.1002/smi.2483

Kinnunen, U., Feldt, T., & Mäkikangas, A. (2008). Testing the Effort-Reward Imbalance model among Finnish managers: The role of perceived organizational support. *Journal of Occupational Health Psychology*, 13(2), 114–127. doi: 10.1037/1076-8998.13.2.114

Kinnunen, U., Feldt, T., Siltaloppi, M., & Sonnentag, S. (2011). Job demands–resources model in the context of recovery: Testing recovery experiences as mediators. *European Journal of Work and Organizational Psychology*, 20(6), 805–832. doi:10.1080/1359432X.2010.524411

Kinnunen, U., & Mauno, S. (Eds.) (2009). *Irtiottoja työstä: työkuormituksesta palautumisen psykologia*. Tampere: Tampere University Press.

Kinnunen, U., Mauno, S., & Siltaloppi, M. (2010). Job insecurity, recovery and well-being at work: Recovery experiences as moderators. *Economic and Industrial Democracy*, 31(2), 179–194. doi: 10.1177/0143831X09358366

Kivimäki, M., Leino-Arjas, P., Kaila-Kangas, L., Luukkonen, R., Vahtera, J., Elovainio, M., . . . Kirjonen, J. (2006). Is incomplete recovery from work a risk marker of cardiovascular death? Prospective evidence from industrial employees. *Psychosomatic Medicine, 68*(3), 402–407. doi: http://dx.doi.org/10.1097/01.psy.0000221285.50314.d3

Kivistö, M., & Kivistö, S. (2009). Palautumista edistävät käytännöt IT-ammattilaisten työhyvinvoinnin voimavarana. *Psykologia*, 44(3), 168–184. Retrieved March 29, 2015, from http://elektra.helsinki.fi/se/p/0355-1067/44/3/palautum.pdf 26.3.2015

Lehto, A-M., & Sutela, H. (2004). *Uhkia ja mahdollisuuksia. Työolotutkimusten tuloksia 1977–2003.* Statistics Finland. Helsinki: Edita Prima.

Lundberg, U. (2005). Stress hormones in health and illness: The roles of work and gender. *Psychoneuroendocrinology, 30*(10), 1017–1021. doi: 10.1016/j.psyneuen.2005.03.014

Mauno, S., Kinnunen, U., Mäkikangas, A., & Nätti, J. (2005). Psychological consequences of fixed-term employment and perceived job insecurity among health care staff. *European Journal of Work and Organizational Psychology*, 14(3), 209–237. doi: 10.1080/13594320500146649

McEwen, B. S. (1998). Stress, adaptation, and disease: Allostasis and allostatic load. *Annals of the New York Academy of Sciences, vol. 840: Neuroimmunomodulation: Molecular aspects, integrative systems, and clinical advances,* pp. 33–44. New York Academy of Sciences, New York, NY. Retrieved November 18, 2014, from http://search.proquest.com/docview/619351158?accountid=136582

Meijman, T. F., & Mulder, G. (1998). Psychological aspects of workload. In P. J. D. Drenth, H. Thierry & C. J. de Wolff (Eds.), *Handbook of work and organizational psychology: Work psychology*, 2nd ed., pp. 5–33. Hove UK: Psychology Press.

Pennonen, M. (2011). *Recovery from work stress: antecedents, processes and outcomes*. Doctoral thesis. Tampere: Tampere University Press. Retrieved May 26, 2014, from http://urn.fi/urn:isbn:978-951-44-8602-9

Rodrigues, I., Bravo, J.M., Peiro, J.M., & Schaufeli, W. (2001). The Demands-Control-Support model, locus of control and job dissatisfaction: a longitudinal study. *Work & Stress*, 15(2), 97–114. doi: 10 1080/02678370110066968

Siltala, J. (2004). *Työelämän huonontumisen lyhyt historia -muutokset hyvinvointivaltioiden ajasta globaaliin hyperkilpailuun*. Helsinki: Otava.

Siltaloppi, M., Kinnunen, U., & Feldt, T. (2009). Recovery experiences as moderators between psychosocial work characteristics and occupational well-being. *Work & Stress*, 23(4), 330–348. doi: 10.1080/02678370903415572

Siltaloppi, M., Kinnunen, U., Feldt, T., & Tolvanen, A. (2011). Identifying patterns of recovery experiences and their link to psychological outcomes across one year. *International Archives of Occupational and Environmental Health*, 84(8), 877–888. doi: 10.1007/s00420-011-0672-1

Siltaloppi, M., Kinnunen, U., Feldt, T., & Tolvanen, A. (2012). Development of need for recovery from work over one year: a person-centered approach. *Anxiety, Stress & Coping*, *25*(1), 23–42. doi: 10.1080/10615806.2010.540649

Sluiter, J. K., Frings-Dresen, M.H.W., van der Beek, A.J., Meijman, T.F., Heisterkamp, S.H. (2000). Neuroendocrine reactivity and recovery from work with different physical and mental demands. *Scandinavian Journal of Work, Environment & Health, 26*(4), 306–316. doi: 10.5271/sjweh.547

Sonnentag, S., & Bayer, U-V. (2005). Switching off mentally: Predictors and consequences of psychological detachment from work during off-job time. *Journal of Occupational Health Psychology,* 10(4), 393–414. doi: 10.1037/1076-8998.10.4.393

Sonnentag, S., Binnewies, C., & Mojza, E.J. (2008). "Did you have a nice evening?" A day-level study on recovery experiences, sleep, and affect. *Journal of Applied Psychology,* 93(3), 674–684. doi: 10.1037/0021-9010.93.3.674

Sonnentag, S., & Fritz, C. (2007). The recovery experience questionnaire: Development and validation of a measure for assessing recuperation and unwinding from work. *Journal of Occupational Health Psychology, 12*(3), 204–221. doi: 10.1037/1076-8998.12.3.204

Sonnentag, S., & Kruel, U. (2006). Psychological detachment from work during off-job time: The role of job stressors, job involvement, and recovery-related self-efficacy. *European Journal of Work and Organizational Psychology, 15*(2), 197–217. doi: 10.1080/13594320500513939

Sonnentag, S., & Natter, E. (2004). Flight attendants' daily recovery from work: Is there no place like home? *International Journal of Stress Management,* 11(4), 366–391. doi: 10.1037/1072-5245.11.4.366

Sonnentag, S., & Zijlstra, F.R.H. (2006). Job characteristics and off-job activities as predictors of need for recovery, well-being, and fatigue. *Journal of Applied Psychology*, 91(2), 330–350. doi: 10.1037/0021-9010.91.2.330

Statistics Finland (2007). Työlliset alueen, toimialan (TOL 2008), ammattiaseman, iän, sukupuolen ja vuoden mukaan 2007–2013. Retrieved November 30, 2015, from

http://pxnet2.stat.fi/PXWeb/pxweb/fi/StatFin/StatFin__vrm__tyokay/055_tyokay_tau_116.px/?rxid=a083f868-0359-4630-b6cc-dde61de773c0

Statistics Finland (2008). Korkeasti koulutetut työlliset toimialoittain 2008–2011 (Toimialaluokitus 2008). Retrieved November 30, 2015, from http://pxnet2.stat.fi/PXWeb/pxweb/fi/StatFin/StatFin__ttt__tthv/061_tthv_tau_106_fi.px/?rxid=a083f868-0359-4630-b6cc-dde61de773c0

Stone, A. A., Kennedy-Moore, E., & Neale, J. M. (1995). Association between daily coping and end-of-day mood. *Health Psychology*, *14*(4), 341–349. doi: http://dx.doi.org/10.1037/0278-6133.14.4.341

Sutela, H., & Lehto, A-M., (2014). *Työolojen muutokset 1977−2013*. pp. 69–70, 195, 199. Helsinki: Statistics Finland. Retrieved November 18, 2014, from http://www.stat.fi/tup/julkaisut/tiedostot/julkaisuluettelo/ytmv_197713_2014_12309_net.pdf

Sverke, M., Hellgren, J., Näswall, K., Chirumbolo, A., De Witte, H. & Goslinga, S. (2004). *Job Insecurity and Union Membership. European Unions in the Wake of Flexible Production.* Brussels: P.I.E.-Peter Lang.

van Veldhoven, M., & Broersen, S. (2003). Measurement quality and validity of the "need for recovery scale". *Occupational & Environmental Medicine*, 60(1), i3–i9. Retrieved January 29, 2015, from http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=fulltext&D=ovft&NEWS=N&LINKOUT=Y&CSC=Y&AN=00022707-200306001-00002